STRENGTHENING AFGHANISTAN'S HEALTH SYSTEM TO SAVE WOMEN'S LIVES: ACHIEVEMENTS AND GAPS IN SCALE-UP OF SAFE DELIVERY SERVICES

By

Hannah Tappis

A dissertation submitted to the Johns Hopkins University in conformity with the requirements for the degree of Doctor of Public Health

Baltimore, Maryland
March 2014

Abstract

Background: There is global agreement that well-functioning health systems are needed to reduce maternal mortality. There is less agreement, however, on what constitutes a functional health system in fragile states or on how to strengthen the capacity of a health system to ensure that all women have access to safe delivery services and timely emergency obstetric care. This dissertation examines the relationship between implementation of a national primary health care package and coverage of safe delivery services in Afghanistan, and identifies barriers that must be addressed to ensure that all women with obstetric complications have access to good quality medical treatment without delay.

Methods: Paper 1 examines the relationship between implementation of Afghanistan's Basic Package of Health Services and skilled birth attendance using routine data from the Ministry of Public Health from 2006 through 2010 and annual evaluations of health system performance in 29 of the country's 34 provinces. Paper 2 assesses the contribution of health system factors to skilled birth attendance coverage using data from a 2010 household survey conducted in nine provinces of north-central Afghanistan. Paper 3 analyzes information from government and non-government organization reports, routine health service statistics, in-depth interviews and focus group discussions to compare barriers to scale-up of intrapartum care services in four districts where maternal mortality studies were conducted in 2002 and 2011.

Results: Results of Paper 1 show a direct relationship between overall health system performance and skilled birth attendance in Afghanistan. Findings suggest that approximately half of the variation in skilled birth attendance rates across provinces can be explained by health facility density and service package implementation, while the remaining variation is likely associated with provincial characteristics not captured in this study. Paper 2 did not show any direct linkages between health facility characteristics and an individual woman's likelihood of skilled birth

attendance, but provided insights into why studies assuming that women seek care at the nearest primary health care facility may lead to misinterpretation of care-seeking patterns or mask the relationship between perceptions of service quality and skilled birth attendance utilization. Paper 3 illustrated the importance of context when evaluating factors that facilitate and hinder safe delivery and emergency obstetric service coverage. When asked about barriers to utilization of intrapartum care services, three common themes highlighted by national policymakers, provincial and district-level healthcare providers, and community members were: (1) structural barriers such as lack of infrastructure or human resource shortages limiting availability of services, (2) programmatic barriers such as limited technical capacity hindering provision of quality care, and (3) contextual barriers affecting when, where and why women deliver at facilities.

Conclusions: Together, the three papers presented in this dissertation show that while there is a strong relationship between primary health care service package implementation and coverage of safe delivery services in Afghanistan, roll-out of this service package may not be an effective approach for scaling up services in extremely remote or insecure settings. Improvements in maternal health services coverage must be measured at a sub-national level, and health care service packages adapted to consider the needs and preferences of households in hard-to reach areas. For example, strategic human resource deployment, investment in referral systems and targeted interventions to strengthen community-facility linkages may be required to extend service coverage in remote areas. Thus, more context specific planning and adaptation of health care service packages at the provincial or district level are recommended. Study findings also illustrate the complexity of health policy planning and resource allocation in conflict-affected settings, and suggest that alternatives to the current service delivery strategy be considered in these areas.

Committee of Thesis Readers

Robert Lawrence, Professor — Committee Chair
Department of Environmental Health Sciences
Johns Hopkins Bloomberg School of Public Health

Shannon Doocy, Associate Professor — Academic Advisor
Department of International Health
Johns Hopkins Bloomberg School of Public Health

David Peters, Professor
Department of International Health
Johns Hopkins Bloomberg School of Public Health

Nicole Warren, Associate Professor
Department of Community-Public Health
Johns Hopkins School of Nursing

Marjorie Koblinsky, Senior Technical Advisor for Maternal Health
Maternal and Child Health Division / Office of Health, Infectious Disease and Nutrition
United States Agency for International Development

Alternate Committee Members:

Janice Bowie, Associate Professor
Department of Health, Behavior and Society
Johns Hopkins Bloomberg School of Public Health

Amy Tsui, Professor
Department of Population, Family and Reproductive Health
Johns Hopkins Bloomberg School of Public Health

Peter Winch, Professor
Department of International Health
Johns Hopkins Bloomberg School of Public Health

Acknowledgements

This dissertation reflects the contributions, advice, collaboration and support from many people around the world, and I am grateful to everyone who has helped make this work possible.

First and foremost, I would like to acknowledge Dr. Shannon Doocy, my advisor, for her guidance throughout the MPH and DrPH programs, and opportunities to work on a number of other projects while this research was underway. I am also grateful to Dr. David Peters, both for allowing me access to health facility and household survey data used in this dissertation and for his thoughtful reviews of preliminary analyses and manuscript drafts as this work evolved over the past three years. Next, I would like to acknowledge Dr. Marge Koblinsky, who has been an invaluable mentor and source of encouragement throughout the dissertation process. I also wish to thank Dr. Nicole Warren and Dr. Robert Lawrence for their guidance and support as members of my preliminary and final oral exam committees. Their careful reviews and insightful feedback have greatly strengthened this work.

This work was conducted in close partnership with colleagues in Afghanistan to whom I am deeply indebted. I am thankful to Sabera Turkmani of the Afghan Midwives Association and to the Jhpiego Afghanistan team, particularly Nasrat Ansari and Partamin Zainullah, for sharing their knowledge, experiences and friendship. Most of what I have learned about the complex challenges of health system strengthening and maternal health service delivery in Afghanistan, I have learned from them.

The primary data collection presented in Paper 3 would not have been possible without a number of other individuals. I am grateful to Dr. Gilbert Burnham for the initial opportunity to work in Afghanistan in 2010, to Dr. Linda Bartlett for hiring me to work on the RAMOS II study, and to

Dr. Peter Winch for his guidance and support throughout the research process. Linnea Zimmerman and I worked together on the design of qualitative study components and management of data collection in 2011, and I could not have completed this work without her technical inputs, friendship and moral support.

I am also very glad to have shared my time at Johns Hopkins with a wonderful group of fellow doctoral students. I would not have been able to complete this thesis work without the camaraderie and friendship of "The Team": William Davis, Nasreen Jessani, Rohit Ramchandani, Michael Humes and Monique Boivin, as well as Pooja Sripad, Elina Dale, Olakunle Alonge, Kayhan Natiq, Ann Lin and Andrew Mirelman. I would also like to thank Christine Kim, Aimee Rose and Courtney Blake for their insights and encouragement to complete this work from Afghanistan, Pakistan, South Sudan and Baltimore. Finally, I would like to thank my parents for their support and motivation to complete this work in 2014.

Contents

Chapter 1 Introduction and background 2
Introduction 2
Maternal health and health system strengthening initiatives in Afghanistan 2
Relationship between health systems and essential maternal health services 5
Health system strengthening in fragile, conflict-affected states 7
Research aims and objectives 8
Organization of the dissertation 9
Chapter 2 Study setting **10**
Stewardship of Afghanistan's health system 11
Structure of Afghanistan's health system 12
Measuring improvements in maternal health services and evaluating "what works" 15
Determinants of access to quality maternal health services in Afghanistan 18
Chapter 3 Methodology **24**
Conceptual framework 24
Paper 1 27
Paper 2 29
Paper 3 30
Role of the researcher 34
Ethical considerations 35
Chapter 4 Scaling up skilled birth attendance with a Basic Package of Health Services in Afghanistan (Paper 1) **37**
Abstract 37
Introduction and background 38
Methods 40
Discussion 51
Conclusion 55
Chapter 5 Determinants of skilled birth attendance in nine provinces of Afghanistan: a multi- level analysis (Paper 2) **68**
Abstract 68
Introduction and background 69
Methods 70
Results 77
Discussion 81
Conclusion 87
Chapter 6 Context matters in essential maternal health service planning: challenges of intrapartum care scale-up in four districts of Afghanistan (Paper 3) **96**
Abstract 96
Introduction and background 97
Methods 99
Results 104
Discussion 113
Conclusion 121

Chapter 7 Conclusions **125**
Summary of results 126
Strengths and limitations 130
Policy recommendations 131
Global implications 136
Bibliography **138**
Annex A **153**
Annex B **154**
Annex C **158**
Annex D **161**

List of Tables

Table 2.1: Maternal health services and staffing by facility type 21
Table 4.1: Health system performance and contextual factors considered for analysis 56
Table 4.2: Provincial characteristics 57
Table 4.3: Percent change in skilled birth attendance and health system performance 58
Table 4.4: Annual change in skilled birth attendance and health system performance 59
Table 4.5: Proportional odds of facility delivery with improved overall health system performance and contextual factors 60
Table 4.6: Proportional odds of facility delivery with improvement in individual health system performance indicators 61
Table 4.7: Linear regression 64
Table 5.1: Socio-demographic characteristics, health system performance and institutional delivery in study provinces 88
Table 5.2: Characteristics of facilities in study sample, by facility type 89
Table 5.3: Characteristics of women included in study sample, weighted 90
Table 5.4: Bivariate analysis of sample characteristics and skilled birth attendance 91
Table 5.5: Results of multilevel logistic regression predicting individual likelihood of skilled birth attendance for most recent delivery 92
Table 6.1: Individual and group interviews conducted by study district 122
Table 6.2: Maternal health service availability in RAMOS study districts in 2010 123

List of Figures

Figure 2.1: Link between BPHS and EPHS 23
Figure 3.1: Conceptual framework 36
Figure 4.1: Increases in the proportion of births delivered at health facilities in Afghanistan between 2006 and 2009/10 by province 65
Figure 4.2: Improvements in health system performance in Afghanistan between 2006 and 2009/10 by province 66
Figure 4.3: Skilled birth attendance and percent of health system performance benchmarks met by province, 2006 – 2009/10 67
Figure 5.1: Map of provinces covered by 2010 Household Survey 93
Figure 5.2: Place of delivery for women utilizing skilled birth attendants 94
Figure 5.3: Reasons women reported for not delivering at a health facility 94
Figure 5.4: Person reported as decision-maker about place of delivery 95
Figure 6.1: Map of RAMOS study areas 124

List of Terms and Abbreviations

AIC	Akaike Information Criteria
ANC	antenatal care
BEmOC	basic emergency obstetric care
BHC	basic health center
BIC	Bayesian Information Criteria
BPHS	Basic Package of Health Services
CEmOC	comprehensive emergency obstetric care
CHC	comprehensive health center
CHW	community health worker
CSO	Central Statistics Office
DH	district hospital
EC	European Commission
EmOC	emergency obstetric care
EPHS	Essential Package of Hospital Services
FGD	focus group discussions
GEE	general estimating equations
HMIS	health management information system
ISAF	International Security Assistance Force
JHSPH	Johns Hopkins Bloomberg School of Public Health
KMO	Kaiser-Meyer-Olkin test of sampling adequacy
MDG	Millennium Development Goals
MICS	Multiple Indicator Cluster Survey
MoPH	Ministry of Public Health
NGO	non-governmental organization
NHSPA	National Health Services Performance Assessment
PH	provincial hospital
QIC	Quasi-likelihood Criterion
RAMOS	Reproductive Age Mortality Study
RBF	Results Based Financing
RH	regional hospital
SD	standard deviation
SH	specialty hospital
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
VPC	variance partition coefficient

Chapter 1 Introduction and background

Introduction

In 2010, there were an estimated 342,900 maternal deaths globally, a decline from 409,100 in 1990.[1] It is often claimed that "we know what works" to improve maternal health, but that the real challenge in reducing maternal mortality is "getting what works to happen" in low-income countries where 99% of maternal deaths occur.[2-5] Because most maternal deaths occur during labor, delivery or the first 24 hours postpartum, ensuring skilled care for every birth has been promoted as the most effective strategy for significantly reducing maternal mortality over the last quarter-century.[6,7] Getting the appropriate mix of skilled health workers and supplies where they are needed most is no easy task, especially in settings where demand for maternity services is low and there is competition for allocation of limited resources.[8] The systemic and operational challenges of scaling up interventions to ensure that all women have access to quality intrapartum care are even greater in fragile states where governments lacks the will or capacity to provide basic services and security.[9] An increasingly common first step in restoring health systems in fragile, post-conflict settings is to rapidly scale-up a core package of cost-effective primary care services, however there are arguments that this approach may have substantial limitations in ensuring the availability and quality of reproductive health services.[10,11] The aims of this dissertation are to examine the relationship between implementation of a standardized primary health care service package and scale-up of safe delivery service coverage in Afghanistan, and to identify conditions that facilitate and hinder the reach of essential maternal health services to the women who need them.

Maternal health and health system strengthening initiatives in Afghanistan

When the Taliban was removed from power in late 2001, Afghanistan had very little public health infrastructure and some of the worst health indicators in the world, including an infant mortality

rate of 165 per 1,000 live births, under five mortality rate of 257 per 1,000 live births and maternal mortality ratio of 1,600 maternal deaths for every 100,000 live births.[12] Health facilities were situated primarily in accessible urban or more secure rural areas, leaving nearly 60% of the population without access to any form of health services.[13] The Ministry of Public Health (MoPH) reported only 467 midwives for a population of 23 million and a 2003 Multiple Indicator Cluster Survey re-analyses found that less than 10% of births were attended by skilled personnel.[14,15]

Rebuilding and strengthening the health sector has been among the top priorities of the Afghan government since the early stages of its establishment in 2002. Acknowledging the limitations of its institutional capacity and the need to work within those constraints to address the population's most immediate health needs, the MoPH focused its efforts on the establishment of and contracting responsibility for provision of a Basic Package of Health Services (BPHS) for primary health care facilities and an Essential Package of Hospital Services (EPHS) for district, provincial, regional and national hospitals. Together, the BPHS introduced in 2003 and EPHS introduced in 2005 define the Afghan health system's entire referral system, from the health post at the village level to tertiary care in major urban centers. The guidelines provide instruction on how each level of primary care facility and hospital should be staffed, equipped, and stocked with supplies to provide a standardized package of high-impact cost-effective services and provide equitable access to healthcare, especially in underserved areas.[16,17]

From the beginning of 2004, the MoPH contracted non-governmental organizations (NGOs) to provide BPHS services in 31 of Afghanistan's 34 provinces and adopted direct responsibility for service delivery in three small provinces near Kabul (Kapisa, Panjshir and Parwan) with financial support provided by the United States Agency for International Development (clusters of districts in 13 provinces), the World Bank (11 provinces, including the three managed by the MoPH) and the European Commission (10 provinces).[18] Although not all areas in every province are covered

by these contracting schemes, BPHS is now provided at more than 9,780 health posts, 680 Basic Health Centers, 381 Comprehensive Health Centers, and 57 District Hospitals.[19] In addition, all three donors provided technical assistance to the MoPH in the form of consultant advisors, trainings, and resources.

In 2005, the MoPH also began to introduce EPHS services through two similar mechanisms - a contracting-in approach wherein service providers are contracted to work within MoPH facilities under the management control of the MoPH and with funding from the public sector, and a contracting-out approach where the delivery of services is provided by NGOs through contracts funded by the United States Agency for International Development and the European Commission. Implementation of EPHS services was much less streamlined than its precursor for primary health care facilities. Financing from various sources was directed at individual facilities, with some hospitals having more resources than others and various levels of staffing, beds, and drugs.[20] Thus, the MoPH launched a Hospital Reform Project to provide resources to selected hospitals to follow EPHS guidelines. Under the MoPH, this project was established to improve the quality of health services through the achievement of multiple objectives, including: dissemination of the EPHS strategy and implementation in selected hospitals; building the management and technical capacities of hospital staff; strengthening the organizational reform process; and ensuring long-term sustainability. Selection criteria for reform hospitals were based on various factors such as feasibility of the reform process (issues of security) and low functionality.[21]

Alongside their support for service delivery, the same donors also supported two pre-service education programs to train and graduate new midwives. One program was designed to strengthen existing Institute of Health Sciences programs for the placement of graduates in hospitals, and the other to establish community midwifery education schools to train providers for BPHS facilities and the community. The graduates of both programs are full-fledged midwives

required to show competency in the same clinical knowledge and skills, but with further focused training to help them address the challenges of community or hospital practice. Since 2004, five Institute of Health Sciences programs and 29 community midwifery schools have been established in 31 provinces, and a National Midwifery Accreditation Board established. The number of trained midwives in the country increased from 467 in 2003 to approximately 2,200 midwives in 2010.[22]

With these initiatives and countless other targeted investments in the health sector, the availability and quality of health care has improved considerably since 2002. Population based studies show improvements in skilled birth attendance estimates from less than 10% in 2003 (6% rural, 35% urban) to 19% in 2006 (rural areas only) and 34% in 2010 (26% rural, 71% urban).[23-25] While this is a notable achievement, skilled birth attendance only contributes to reduction in maternal mortality if the trained provider is able to detect complications and either provide lifesaving treatment or facilitate safe, timely referral to a facility and provider than can, and a 2010 facility assessment found that only 56% of the hospitals intended to provide emergency obstetric care actually deliver these services.[26]

Relationship between health systems and essential maternal health services

Health systems provide the arena within which strategies to improve maternal health are designed, delivered and accessed. According to the World Health Organization, a 'health system comprises all organizations, institutions and resources devoted to producing actions whose primary intent is to improve health'. Although service delivery is only one of the functions that a health system has to perform, it can be argued that it is the primary function, an immediate output of the inputs of the other building blocks, such as health workforce, medical products and financing. Measures of service delivery include access, utilization and coverage, which indicate whether people are receiving the services they need.[27,28]

Maternal health scholars often state that, perhaps more so than other services, the provision (or not) of maternal and newborn health care is a 'litmus test' of the health system as a whole.[5,29] Kerber *et.al.* explain that monitoring implementation of the continuum of care for the health of mothers, neonates and children can be used to track the performance of health systems, since a functional continuum depends on strong systems and public health planning.[30] Bailey *et al.* similarly make the case that measuring the adequacy and distribution of the number of facilities providing emergency obstetric care at different levels of the health system is in effect a measure of the performance of the health system as a whole because for a facility to fully function as an emergency obstetric care provider, there must be a functional health system in place, including physical infrastructure of facilities, human resources, procurement and distribution of drugs and supplies, referral systems, health information system, health care financing and policies to regulate all of these elements.[31] Few researchers, however, have attempted to model the linkages between health system strength and maternal health service provision or outcomes.

Two recently published studies examine the extent to which stronger health systems and contextual factors contribute to greater skilled birth attendance and reduced maternal mortality. Kruk and Prescott conducted a multi-level cross-sectional analysis of Demographic Health Surveys conducted from 1996 onwards and found that national and community level factors, particularly health system characteristics, explained 66% of the variation in skilled birth attendance across countries, whereas individual-level factors explained only 16%.[32] Muldoon et al used data from a number of publically available data sources to examine the relationship between proxy indicators for health system building blocks and infant, child and maternal mortality, finding higher physician density (health workforce), sustainable access to water and sanitation (infrastructure), and less corrupt government (leadership and governance) to be significantly associated with lower maternal mortality ratio across 136 United Nations member countries.[33] No study to date, however, has examined the relationship between health system characteristics and

maternal health indicators at a sub-national level, or the dynamics of these relationships over time, both of which are critical for drawing conclusions about how to improve health system strength and functioning in any context.

Health system strengthening in fragile, conflict-affected states

The capacity to provide health services is often extremely limited in countries emerging from conflict. The health service infrastructure can be severely damaged, the availability and training of health staff reduced, the drug supply affected, management systems weak, and capacity of the government health authorities limited. In some cases, there is also a proliferation of NGOs and vertical programs, which may be poorly coordinated and regulated. Despite the wealth of challenges, the transition and post-conflict periods in fragile states represent opportunities to re-align systems when rebuilding health services and to experiment with new delivery models to make health care more effective and equitable.[10,34] Some researchers also argue that rebuilding effective health systems following conflict can also contribute to enhanced legitimacy of the state, known as the "peace dividend".[35,36] Other experts, while acknowledging this possibility, contend that there is little empirical evidence of this effect to date.[37]

Regardless of positions on health system strengthening as a tool for peacebuilding and stabilization, there is little disagreement that responding to the immediate needs of the population takes priority over actions to build government capacity where the state is a weak or non-existent partner although debates arise regarding how to do the former without doing damage to the latter.[38] Newbrander reminds stakeholders that the challenges of rebuilding and strengthening health systems in fragile states are not unique, compared to those that other developing countries face, but the scale of the problems and the obstacles that must be overcome frequently are much greater. A deep understanding of the context is vital to finding the appropriate balance between

focusing on specific improvements required to meet priority health program needs, and beginning to address longer-term health system stewardship, management and governance.[39,40]

Research aims and objectives

The aims of this this dissertation are to assess the relationship between implementation of the Basic Package of Health Services and safe delivery service coverage in Afghanistan, and to identify conditions that facilitate and hinder the reach of essential maternal health services to the women who need them. Specific research objectives are:

- To examine progress in provincial implementation of the Basic Package of Health Services, scale-up of skilled attendance, and the relationship between the two;
- To assess whether facility-level measures of health system performance are associated with an individual woman's likelihood of skilled birth attendance;
- To describe structural, programmatic and contextual factors that affect provision and utilization of intrapartum care services.

This study comes at a time when Afghanistan is undergoing a political transition and international donor agencies are reconsidering their strategies for engagement in the country. There is also global interest in ways in which multi-lateral organizations, bi-lateral organizations, and private foundations can deliver aid more effectively to strengthen healthcare systems and improve health outcomes in fragile states. Understanding the achievements and gaps in efforts to scale up safe delivery services in Afghanistan over the last decade can help guide priority setting for national and international stakeholders, and lessons learned can inform policy and program development in other conflict-affected settings with high maternal mortality rates and low health service coverage.

Organization of the dissertation

This dissertation is organized as follows:

- Chapter 2 describes the structure and management of the public health care system in Afghanistan.
- Chapter 3 provides a conceptual framework and overview of the methods used for data collection and analysis.
- Chapter 4 assesses the relationship between BPHS implementation and skilled birth attendance in 29 of the 34 provinces of Afghanistan between 2006 and 2009/10 (Paper 1).
- Chapter 5 examines the individual/household and facility level determinants of skilled birth attendance in nine provinces in north-central Afghanistan in 2010 (Paper 2).
- Chapter 6 explores the barriers to scale-up of provision and utilization of intrapartum care services in four districts of Afghanistan selected to reflect varied degrees of remoteness and access to health services (Paper 3).
- Chapter 7 summarizes the findings from the three previous chapters, provides policy recommendations for Afghanistan and discusses the relevance of conclusions to global public health research and practice.

Key tables and figures appear at the end of each chapter. Additional information on data sources and methods used can be found in Annexes A, B, and C. Supplemental analyses conducted for Paper 1 can be found in Annex D.

Chapter 2 Study setting

Afghanistan is a land-locked country, covering a total area of 647,500 km^2 in southern-central Asia. It is a multiethnic society with a population of approximately 30 million that is divided into 34 provinces which are further divided into districts. Its climate is arid with extreme seasonal variations in temperature and terrain is varied, rugged, and mountainous in many areas.[41]

Afghanistan was recognized as a member state of the United Nations in 1919, and first constitution put into effect in 1923. International relations were initiated by King Amanullah Khan, who was known for promoting co-educational public schools and abolishing the use of the burqa. Strong opposition to these reforms, including rebel takeover of Kabul City, forced Amanullah to abdicate the throne in 1929. Rebel forces remained in power for 11 months, until they were defeated by Amanullah's cousin who served as king until he was assassinated in 1933. The king's son, Shah Mohammed Zahir Shah succeeded the throne and served for 40 years as Afghanistan's last royal ruler, continuing the policies of his father with various reforms introduced and repealed by a series of prime ministers. In 1972 Zahir Shah was ousted by his cousin and former Prime Minister, Mohammed Daoud Khan, who declared the country a republic and installed himself as President. In 1978, Khan was killed in a violent military coup by the communist People's Democratic Party of Afghanistan. Within months, opponents of the new national leadership launched an uprising in eastern Afghanistan and Soviet forces invaded to defend the communist government. With the United States providing support for the Afghan mujahedeen, war between Afghan insurgents and Soviet occupier-backed government persisted until the Soviet Army withdrew in 1989. The country then remained in a state of civil war until 1992 when the communist regime collapsed and Afghan parties signed a power-sharing accord that created the Islamic State of Afghanistan. Although an interim government was established,

regional militias continued to fight for power, leaving the country without strong central leadership until the Taliban seized Kabul in 1996, renaming the country the Islamic Emirate of Afghanistan and imposing a series of restrictive laws severely limiting the freedoms of the Afghan population. Under these laws, female children were no longer allowed to attend school and women were no longer permitted to work, leave home without male accompaniment, or be seen in public without a burqa.[42]

In 2001, the Taliban was forced from power, a new Afghan government formed with Hamid Karzai as President, the International Security Assistance Force (ISAF) established by the United Nations Security Council to help ensure security, and international agencies began investing in supporting the newly established government in reconstruction and development efforts.[19] Although victory over the Taliban has long been declared and Afghanistan described as "post-conflict" setting for over a decade, terrorist attacks and ongoing conflict between armed opposition groups and international forces has strained the fabric of society in many areas.[43]

Stewardship of Afghanistan's health system

In light of the lack of public health infrastructure and limited capacity of the newly established government, it was determined in initial health system planning efforts that the MoPH would take on a stewardship role, focusing on policy development, regulation, and oversight rather than direct service provision.

The Afghan government released an interim National Health Policy and Strategy in 2003, followed by a National Health Policy for 2005-2009. These focused on laying the foundations for equitable, accessible quality health care through implementation of the BPHS. These guiding documents were then replaced by the Afghanistan National Development Strategy for 2008-2013,

which laid out the ways by which Afghanistan should progress toward achievement of the Millennium Development Goals, including a Health and Nutrition Sector Strategy that maintained emphasis on strengthening the health system to reduce maternal and child mortality, reinforced the stewardship role of the MoPH and outlined a process of decentralization of operational responsibilities for BPHS and EPHS to the Provincial Health Offices.[41]

Structure of Afghanistan's health system

The tiered structure of Afghanistan's health delivery system outlined in the BPHS and EPHS is similar to that present in other developing countries. Health posts, basic health centers and comprehensive health centers offer basic curative and preventive services at the community level. The sophistication of health infrastructure and services increases moving from district to urban hospitals, with the district hospital serving as the link between primary care facilities and the network of referral hospitals. The guidelines for each level of facility are as follows:[17,44]

- Health posts are intended to be the first point of contact for health care services. Each facility is intended to cover a population of 1,000-1,500, which is equivalent to 100-150 families. These posts should be staffed with male and female community health workers who are not health professionals but who have received targeted training. Community health workers at health posts (often their home) are not considered skilled birth attendants.

- Sub-centers are established to extend services to the most remote and geographically difficult areas. A typical facility is staffed with a male nurse and community midwife, and covers a population of 2,000-15,000.

- Basic health centers (BHC) should supervise sub-centers and health posts and provide outpatient antenatal, delivery and postpartum care, as well as immunization, integrated

management of childhood illness, and tuberculosis treatment. Each BHC is intended to cover a population of 15,000 – 30,000, depending on the remoteness of its location. Staffing requirements include a nurse, two vaccinators, and a community midwife that can facilitate normal deliveries and refer complicated cases to higher-level facilities as necessary.

- Comprehensive health centers (CHC) are intended to cover a population of 30,000 – 100,000 people and provide a wider range of services than BHCs. They should have space for inpatient care and a laboratory. Staffing requirements include male and female doctors, male and female nurses, female community midwives, and laboratory and pharmacy technicians. CHCs are expected to provide basic emergency obstetric care and blood transfusion services but are not equipped with blood banks.

- District hospitals (DH) are designed to be referral points at the district level that provide all services outlined in the BPHS, as well as additional services outlined in the EPHS. **Figure 2.1** illustrates the role that district hospitals play as the link between primary health care facilities providing the BPHS and hospitals designed as tertiary care facilities. DH should cover a catchment population of 100,000 – 300,000 people and be staffed with a general surgeon, an obstetrician/gynecologist, an anesthetist, a pediatrician, hospital midwives, laboratory and x-ray technicians, and a pharmacist. DH are expected to provide comprehensive emergency obstetric care, including cesarean surgery and blood transfusion services.

- Provincial hospitals (PH) should have 100 to 200 beds and provide the same clinical services as district hospitals. PH may have more sophisticated equipment than DH may also have specialist staff with capacity to provide more advanced care in certain areas. PH are

designed to be the last referral point for patients referred from DH, but can refer patients to regional hospitals or specialty hospitals in Kabul if required.

- Regional hospitals (RH) should have 200 to 400 beds and provide the same services as provincial hospitals as well as specialty surgical, laboratory and imaging services. There are four RH in Afghanistan, located in Balkh, Herat, Kandahar, and Kunduz provinces.

- National specialty hospitals (SH) are the highest level of referral centers for tertiary medical care. There are two specialty women's hospitals in Afghanistan, as well as two national general hospitals with maternity wings, all located in Kabul City.

A more detailed outline of maternal health services and expected staffing at each level of facility is presented in **Table 2.1.**

Contracting mechanisms for BPHS and EPHS service delivery vary by donor. In eight provinces the World Bank contracts NGOs to provide BPHS services using performance-based partnership agreements that provide for rewards of up to 10% of the contract value if agreed upon performance objectives are met or exceeded. In three provinces, the World Bank contracts directly with the Provincial Health Office, which holds the same responsibilities for service provision as contracted NGOs do in other provinces. All World Bank support for BPHS implementation is channeled through the Ministry of Finance and paid out by the MoPH. The United States Agency for International Development contracts NGOs to provide BPHS services in 13 provinces and provides additional funds to the MoPH and certain NGOs for technical assistance. Performance targets are established during contract negotiations and are monitored by provincial level MoPH officials. In the remaining 10 provinces, the European Commission awards grants to NGOs that are not performance based and require only modest involvement of

the MoPH. Their funding mechanisms resemble traditional grant-based funding, utilizing a competitive process for award selection, but NGOs set their own performance targets in consultation with the donor.[19,45]

The MoPH requires that all BPHS agreements adhere to the National Salary Policy, but NGOs are responsible for all aspects of facility management, including staff recruitment. The National Salary Policy was first issued in 2003 and revised in 2005 in an effort to standardize health worker salaries across NGOs and discourage "brain drain" from rural to urban areas by providing a rural hardship allowance for doctors, midwives, nurses and laboratory technicians working at facilities that meet certain criteria.[46]

Measuring improvements in maternal health services and evaluating "what works" in Afghanistan

A number of mechanisms have been put in place to monitor implementation of the BPHS and EPHS, and to evaluate more targeted maternal health focused interventions, however very few have been designed to investigate *how* interventions improve service provision or the conditions that explain *why* interventions are more successful in some areas of the country than in others.

Since 2004, implementation of the BPHS has been assessed through Afghanistan's National Health Service Performance Assessment (NHSPA). This assessment, conducted by Johns Hopkins Bloomberg School of Public Health in collaboration with the Indian Institute of Health Management Research and the Afghanistan MoPH, provides an overall measure of system performance and patient care by employing a Balanced Scorecard tool to measure six performance domains: patient and community perspectives, staff perspectives, capacity for service provision, service provision, financial systems and overall vision. A similar scorecard was introduced to assess hospital performance at EPHS implementation in 2007. Annual NHSPA

reports submitted to the MoPH include indicators for provision of delivery care and are publically available. In addition, academic journal articles have been published, illustrating the performance trends in delivering the BPHS from 2004 through 2009 and reflecting on the potential and limitations of the scorecard as a performance management tool to measure and improve health service delivery in similar contexts.[47] Additional analyses have been conducted using Balanced Scorecard data from the NHSPA to assess determinants of primary care service quality in 2004;[48] compare changes in the utilization of outpatient curative services at facilities with different contracting mechanisms in 2004-2005;[49] assess trends in the quality of healthcare for children under five from 2004-2006[50]; compare methods for obtaining reliable measures of provider performance in pediatric ambulatory care services;[51] and to assess the effect of wealth status on care-seeking patterns and health expenditures.[52] There has been no effort to date, however, to use Balanced Scorecard data to examine the effect of BPHS and EPHS implementation on maternal health service provision or quality.

In 2006, a household survey was conducted in 29 provinces (Helmand, Kandahar, Nooristan, Uruzgan and Zabul provinces were excluded due to insecurity), with the primary aim of assessing the impact of BPHS implementation. This multistage cluster survey, designed to be representative of rural Afghanistan, found that 16% of married women used at least one form of modern contraception, 32% of women who were pregnant in 2004-2005 saw a skilled antenatal provider at least once during their pregnancy, and 19% had a skilled attendant at delivery (including 15% that had institutional deliveries).[53] Viswanathan et al then used this data to assess whether the presence of a community health worker in the village led to an increase in the use of modern contraceptives, skilled antenatal care and skilled birth attendance (defined as assistance by a doctor, nurse or midwife), as at the time only 40% of rural villages had a female community health worker. The study found that odds ratios for female community health worker presence

on all three outcome variables were similar in magnitude to those for household wealth status and mother's education – two variables consistently found to be strongly associated with use of reproductive health services in Afghanistan and other settings (increased use of contraceptives odds ratio=1.61, 95%, CI=1.21 to 2.15; antenatal care odds ratio =2.71, 95% CI=1.87 to 3.92; skilled birth attendance odds ratio=1.75, 95% CI=1.18 to 2.58).[53] Similar analyses were not conducted to assess whether other elements of BPHS implementation (e.g. facility staffing, supply provision, facility functionality) were associated with an increase in essential maternal health service utilization.

A 2008/09 evaluation of the pre-service midwifery program included analysis of the potential impact of the increased numbers of midwives on maternal health service utilization, and concluded that provinces which graduated midwives before June 2006 reported a 14.6 percentage-point increase in skilled birth attendance to a total of 22.6%, whereas provinces without midwives reported a 5.5 percentage-point increase to a total of 13.5% – an absolute difference in differences of 9.1 percentage points (62.3% proportional difference), suggesting that the presence of new midwives contributed to the increase in skilled birth attendance. The study found, however, that midwives' competency to provide life-saving procedures varied substantially from one province to another, depending on the competency, availability of equipment and supplies, and patient volume.[22] Other studies of the midwifery program have focused on documenting the process of establishing and accrediting midwifery schools, but did not look at the effect or impact on delivery or utilization of services. [54-56]

A 2010 assessment of emergency obstetric and neonatal care needs across the country found similar variations in capacity at first-level referral hospitals and health facilities across the country. Only 56% of the facilities expected to provide comprehensive emergency obstetric care

actually did so during the last three months of 2009, with greater gaps in service provision seen at lower-level health facilities. Maternity ward staff explained human resource limitations were the most common reason for not performing cesarean surgeries when indicated, and lack of training was the most common reason for not providing neonatal resuscitation or assisted vaginal delivery when needed. Management issues were the most common reasons reported for not performing blood transfusions.[26] As a cross-sectional study, however, the assessment was not designed to investigate the cause-and-effect relationship between these gaps and elements of facility performance, or to draw conclusions about the minimum level of human resources, training, and management systems or working conditions needed to ensure that lifesaving services are provided to women who need them.

Finally, a 2011 study examined the comparative cost and technical efficiency of contracting out and contracting-in models for BPHS service delivery. The study found that provinces where the MoPH is responsible for BPHS service provision are performing lower with regard to technical efficiency, but are doing so partly because of a lower investment. Contracted out facilities were more technically efficient, while the average cost per BPHS outpatient visit was lower at contracted in facilities. Overall, it found that an approximate 60% increase in costs yields a 17% increase in technical efficiency of outpatient services, but did not examine efficiency or effectiveness in terms of maternal health services.[57]

Determinants of access to quality maternal health services in Afghanistan

In Afghanistan, only a handful of studies have been conducted to examine determinants of maternal and perinatal mortality, understand barriers to institutional delivery, and assess the quality of care and record keeping at facilities. Nearly all of these studies only examine conditions at specialty maternity hospitals in Kabul city, where delays in care seeking, accessing

a facility, and receiving care once at the facility may be quite different from those in more remote and/or insecure areas. Khorrami et al. conducted a survey of patients receiving obstetric care at a maternity hospital in Kabul City in 2005 to evaluate the accessibility of the hospital, finding that half of the women admitted to the facility had traveled more than one hour to reach it and only felt "mildly" or "moderately" safe traveling to get there.[58] Kandasamy et al. used data from the delivery room logbooks at the same hospital to evaluate the determinants and outcomes of cesarean delivery practices at the facility, identifying a need for improved labor monitoring and delivery care.[59] Guidotti et al analyzed 2006 maternal and newborn surveillance system data based on labor and delivery logbooks at four maternity hospitals in Kabul City and found a high levels of perinatal mortality associated with cesarean sections, suggesting that delays in reaching care and poor quality of services may contribute to high levels of perinatal mortality at some facilities.[60]

Sundaram's 2007 qualitative study in the catchment areas of four comprehensive health centers, each located in a different province within six hours drive from Kabul City, found that both women and men considered pregnancy and labor to be normal processes; most community members reported seeking skilled care only when problems arise. The main barriers to care-seeking reported in the four study areas were distance to facilities, lack of transport, poverty, insufficient or ineffective drugs in facilities, and gender-related customs.[61] Another study conducted during the same year by Hirose et al. in Herat province used a cross-sectional survey to identify risk factors associated with delays in care-seeking among women admitted to the regional hospital in life-threatening conditions. The hospital, which is one of the largest in the country with 17 obstetricians and 40 beds at the time of the study, is the only designated comprehensive emergency obstetric care facility in the province and receives referrals of complicated cases from neighboring provinces. The study found considerable differences in

factors associated with delays in the decision to seek care and departure delays. The decision delay was mainly explained by exposure to health services, household economic status, and a woman's' household status. The departure delay was largely explained by geographical accessibility to health care, seasons, and the size of the husband's social network. In addition, the duration and determinants of decision delay were strongly influenced by the nature of the symptoms. When the symptoms were clear, poverty was associated with longer decision delay. When the symptoms were less obvious, weak matrilineal family relationships were associated with delayed decisions. For complications occurring after the 22nd week of gestation, the absence of a midwife increased the delay in decision making.[62] A deeper understanding of when women seek care, where, and why is critical for improving coverage of safe delivery services and ensuring that women with obstetric complications have access to timely life-saving care needed to survive and lead healthy lives.

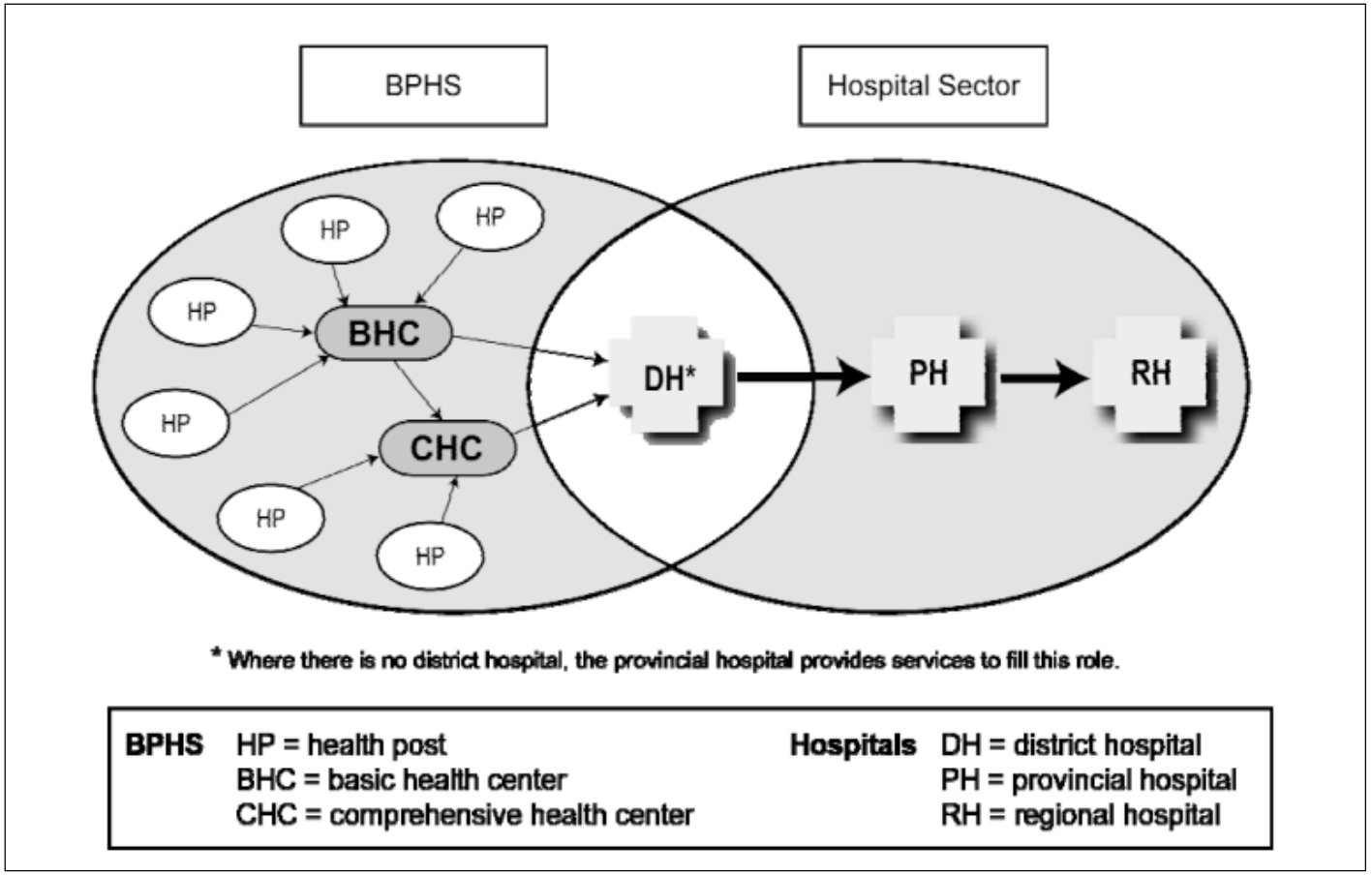
Table 2.1: Maternal health services and staffing by facility type

Facility Type	Services	Staffing
Health Post (catchment 1,000-1,500 people or 100-200 families)	* Provide antenatal care, refer complicated cases * Refer all delivery cases * Identify sick newborns and refer after first aid * Provide counseling on family planning and exclusive breastfeeding * Provide micronutrient supplementation * Distribute condoms and oral contraceptives, provide follow-up for injectable contraceptives	1 male community health worker 1 female community health worker
Basic Health Center (catchment 15,000-30,000 people)	* Provide antenatal care, refer complicated cases * Assist with normal deliveries, identify complication danger signs and refer cases * Detect postpartum anemia and puerperal infection * Identify sick newborns and refer after first aid * Promote exclusive breastfeeding Provide micronutrient supplementation * Provide counseling on family planning * Distribute condoms and oral contraceptives, provide injections and IUDs if trained person available	1 male nurse 1 community midwife 1 community health supervisor 2 vaccinators 1 physician (male or female) 2 cleaners/guards
Comprehensive Health Center (catchment 30,000-60,000 people)	* Provide antenatal care, treat mild pre-eclampsia/eclampsia and incomplete miscarriage/abortion * Assist with normal deliveries, provide basic emergency obstetric care * Detect postpartum anemia and puerperal infection * Treat neonatal infections and sepsis * Promote exclusive breastfeeding Provide micronutrient supplementation * Provide counseling on family planning * Distribute condoms and oral contraceptives, provide injections and IUDs if trained person available	1 male nurse 1 female nurse 2 community midwives 1 community health supervisor 2 vaccinators 1 male physician 1 female physician 1 laboratory technician 1 pharmacy technician 1 administrator 4 guards/cleaners
District Hospital (catchment 100,000 – 300,000 people; 25-75 beds)	* Provide antenatal care, treat mild pre-eclampsia/eclampsia and incomplete miscarriage/abortion * Assist with normal deliveries, provide comprehensive emergency obstetric care * Detect postpartum anemia and puerperal infection * Treat neonatal infections and sepsis * Promote exclusive breastfeeding Provide micronutrient supplementation * Provide counseling on family planning * Distribute condoms and oral contraceptives, provide injections and IUDs * Female and male sterilization	2 male physicians 2 female physicians 2 surgeons 1 obsetrician/gynecologists 1 anesthetist 1 pediatrician 5 male nurses 5 female nurses 2 anesthetic nurses 4 midwives 1 community health supervisor 1 pharmacist 2 vaccinators 2 laboratory technicians 2 blood bank technicians 1 x-ray technician

Provincial hospital (75-250 beds)	* Provide antenatal care, treat mild pre-eclampsia/eclampsia and incomplete miscarriage/abortion * Detect and treat cardiac disease and diabetes in pregnancy * Assist with normal deliveries, provide comprehensive emergency obstetric care * Detect postpartum anemia and puerperal infection * Treat neonatal infections and sepsis * Promote exclusive breastfeeding Provide micronutrient supplementation * Provide counseling on family planning * Distribute condoms and oral contraceptives, provide injections and IUDs * Female and male sterilization	5 general physicians (male) 5 general physicians (female) 4 surgeons 3 obstetrician/gynecologists 2 anesthetists 2 pediatricians 18 male nurses 18 female nurses 4 anesthetic nurses 8 midwives 2 pharmacists 2 vaccinators 2 laboratory technicians 2 blood bank technicians 1 x-ray technician
Regional hospital (300-450 beds)	* Provide antenatal care, treat mild pre-eclampsia/eclampsia and incomplete miscarriage/abortion * Detect and treat cardiac disease and diabetes in pregnancy * Assist with normal deliveries, provide comprehensive emergency obstetric care * Provide abortion due to medical indication if approved by special committee * Detect postpartum anemia and puerperal infection * Treat neonatal infections and sepsis * Promote exclusive breastfeeding Provide micronutrient supplementation * Provide counseling on family planning * Distribute condoms and oral contraceptives, provide injections and IUDs * Female and male sterilization	10 general physicians (male) 10 general physicians (female) 6 surgeons 5 obstetrician/gynecologists 3-4 anesthetists 4 pediatricians 18 male nurses 18 female nurses 4 anesthetic nurses 12 midwives 3 pharmacist 2 vaccinators 4 laboratory technicians 3 blood bank technicians 2 x-ray technician

Note: Staffing advised is a comprehensive list for BPHS facilities[63] and a minimum list for EPHS facilities[17]

Figure 2.1: Link between BPHS and EPHS



Source: Ministry of Public Health. *A Basic Package of Health Services for Afghanistan, 2005/1384.* Kabul: Ministry of Public Health, Islamic Republic of Afghanistan, 2005. [63]

Chapter 3 Methodology

Conceptual framework

To increase the coverage of safe delivery services, barriers to both the supply and demand sides of health care provision must be addressed. On the supply side, service availability is dependent on the ways in which policies and plans are understood and implemented by stakeholders, program managers and care providers.[64,65] On the demand side, physical and geographical barriers to service utilization are further complicated by individual, household and community level contextual and socio-cultural factors that may influence where, when and how women seek care for obstetric complications when they occur.[66]

This study is guided by a conceptual framework that is an adaptation of Bryce et al's common framework for evaluating the scale-up to Millennium Development Goals for maternal and child survival. Bryce et al's model is based on the assumption that responsive health systems are an essential prerequisite for scaling up maternal and child health services, and builds on the work of the International Health Partnership and World Health Organization to develop strong country monitoring and evaluation platforms for national health strategies. [40,67,68]

The framework for this study, illustrated in **Figure 3.1,** outlines the pathways through which 'inputs' (health policies and program strategies) are implemented through 'processes' (health system strengthening and technical capacity building initiatives) to achieve intermediate outputs (decisions to seek care, ability to reach care, readiness to provide care) and outcomes (safe delivery service coverage and quality) that contribute to reductions in maternal mortality.

At each level beyond the 'inputs', the model borrows elements from a number of other health systems, health systems strengthening and health service delivery frameworks to illustrate the linkages between health system functions and maternal health outcomes, and to capture the influence of contextual factors at all levels of health service design and implementation.

The content at the process level of the framework includes the six "building blocks" presented as desirable attributes of a well-functioning health system in the World Health Organization health systems framework, but displays them as adjustable dials or knobs similar to Roberts et al's "control knobs" representing possible avenues to health system performance and equity.[69,70] The fact that the circles are connected or overlapping is intentional; this is done to recognize the interdependence of various parts of the health system and that even though some efforts to improve service coverage may only focus on select elements of the system, it is ultimately the combination of different components and the dynamic interactions between them that will influence the availability, accessibility and utilization of services.

Moving down the framework, the outputs illustrated – decision to seek care, ability to reach care and readiness to provide services – are borrowed from conceptual models published by Thaddeus and Maine and by Gabrysch to illustrate barriers to achieving intrapartum care.[71,72] Thaddeus and Maine considered the experiences of women delivering at home with obstetric complications and conceptualized the barriers to achieving care in this situation as a series of three delays: delays in deciding to seek care, delays in reaching a health facility that provides emergency obstetric care, and delays in receiving adequate care at that facility. Gabrysch built on this work to describe four categories of determinants of intrapartum care utilization as a preventative measure in 'normal' uncomplicated deliveries: sociocultural factors, perceived benefit/need of skilled attendance, economic accessibility and physical accessibility. In the framework for this study, factors

affecting the availability, accessibility and utilization of safe delivery services are represented as the influence of contextual factors on the output level of the model, with the understanding that these outputs are results of inputs and processes that are also heavily influenced by a variety of contextual factors.

The outcomes illustrated represent the result of the interactions between supply-side, demand-side and contextual factors at each level of the model from health policy formation to service availability, accessibility, and care-seeking. Finally, service quality and coverage combine with contextual factors to impact maternal mortality. The impact level is presented to highlight the ultimate goal of scaling up safe delivery services in Afghanistan – to reduce maternal mortality.

Altogether, this framework is a simplified model for illustrating the pathways from health policy and strategy formation to population health. Although, like the common framework it is adapted from, this framework does not account for the complexity of actual health policy and program implementation which may involve feedback loops, emergent behavior and phase transitions typical of complex adaptive systems, it is a useful starting point for understanding how strengthening a health system can result in improved maternal health, and for identifying conditions that facilitate and hinder the reach of essential maternal health services to the women who need them.[40]

The three papers presented in this dissertation focus primarily on the process, output and outcome levels of the framework, examining the relationship between implementation of the BPHS and safe delivery service coverage, assessing the various determinants of skilled birth attendance utilization, and exploring the successes and challenges of scaling up intrapartum care services in different contexts with varying degrees of remoteness and insecurity.

Paper 1

Paper 1 focuses primarily on the process level of this framework, exploring the relationship between BPHS implementation and skilled birth attendance coverage over the period from 2006 through 2009/10.

Data Sources

Secondary data from multiple national data sources were linked for this study:

Health Management Information System

Health facility characteristics and service statistics were extracted from the national Health Management Information System (HMIS). The HMIS was launched in 2003 and revised in 2005 to conform with BPHS and EPHS guidelines launched in that year.[73] The steps in HMIS data collection, transmission, analysis and feedback are illustrated in **Annex A**.

Central Statistics Office

Population projections were extracted from annual circulars published by the Central Statistics Office. The only census conducted in Afghanistan was completed in 1979. A pre-census household listing exercise was conducted in 29 provinces between 2003 and 2005, but a full census exercise is yet to be completed. Provincial population projections produced by the Central Statistics Office are based on estimates produced in 2004 to determine the composition of the Lower House of the National Assembly, calculated by taking the average of the projections from the 1979 census base population and data from the ongoing household listing for the provinces where both of these population estimates were available, and based solely on the 1979 census population where it is the only source of data available.[74]

National Health Services Performance Assessments

Information on health system performance was extracted from annual National Health Service Performance Assessment (NHSPA) reports. The NHSPA Balanced Scorecard for primary healthcare facilities is conducted each year using a stratified random sample of all health facilities providing the BPHS and systematic random samples of patients and health workers. Sampling methods, data collection tools and analysis methods are published elsewhere, and summarized for easy reference in **Annex B**.

Other data sources

Data capturing provincial characteristics was extracted from a number of publically available sources. Geographic area of each province was obtained from the Afghan Geodesy and Cartography Office (AGCHO).[75] The percent of the population living below the national poverty line, percent of the population that is literate, and average distance to a drivable road for each province was extracted from the 2007/08 National Risk and Vulnerability Assessment report.[76] Data on security incidents reported by the Afghanistan NGO Safety Office in 2008 was extracted from provincial profiles available on the North Atlantic Treaty Organization Civil-Military Fusion Center's web portal, CIMICweb.[77]

Analytical methods

Analysis was conducted in three stages. First, exploratory data analyses were conducted to examine the extent and pattern of missing data, frequencies, distributions, proportions, outliers and multi-collinearity. Graphical tools were used to assess distribution of continuous variables, and to explore frequencies for categorical variables. Second, methods similar to those employed by Edward et al were used to assess trends in health system

performance measures over time.[61] Wilcoxon matched pair signed rank tests were used to measure the difference in health system performance indicators between 2006 and 2009/10, with pairs being baseline and endline performance scores for each province. Generalized estimating equations with robust variance estimation were used to assess the linear changes for each health system performance indicator and for the proportion of deliveries at health care facilities over the four year period. Third, several types of linear regression models were fit to explore the association between health system performance and skilled birth attendance, accounting for repeated measures for each province over the four year period.

Paper 2

Paper 2 assesses the contribution of health system factors to skilled birth attendance coverage by using cross-sectional multilevel modeling techniques to examine individual/household and facility-level determinants of skilled birth attendance in nine-provinces of north-central Afghanistan.

Data sources

Secondary data for this study was extracted from the final dataset from a 2010 household survey designed to collect baseline information on the coverage of health services in nine provinces that would participate in a pilot Results-Based Financing intervention funded by a multi-donor trust fund administered by the World Bank. The survey was designed and conducted by Johns Hopkins Bloomberg School of Public Health as part of a contract to provide technical assistance to the MoPH from 2009 through 2013. Sampling methods, data collection tools and analysis methods for the original survey are not publically available but were provided by the Principal Investigator to inform this study.

Analytical methods

Analysis for this paper was also conducted in three stages. First, exploratory data analyses were conducted to examine the extent of missing data and dispersion of the outcome and explanatory variables. Then, bivariate analyses were conducted to examine the nature of association between study sample characteristics and skilled birth attendance. Third, multilevel modeling techniques were used to fit logistic regression models assessing the association between measured individual/household and facility characteristics and an individual's likelihood of skilled birth attendance.

Paper 3

Paper 3 examines the influence of contextual factors on both the provision and utilization of intrapartum care services in four districts of Afghanistan, ranging from the an extremely remote and isolated district in the mountainous north to a relatively insecure rural district in the conflict-affected south, a semi-rural district in the east and the densely populated capital city in the center of the country.

Data collection

Data collection for Paper 3 was conducted as part of a study commissioned by the United States Agency for International Development to measure changes in risk of maternal death in four districts of Afghanistan where a maternal mortality study was conducted in 2002.[78] All qualitative study tools were designed with dual aims – to identify reasons for changes in maternal mortality observed in each of the study districts, and to gain a better understanding of the conditions that facilitate and hinder provision of maternal health services at a district level.

Various methods were used for collecting information about intrapartum care availability, utilization and quality, including a literature review, secondary analysis of data from the government's Health Management Information System at the province and district level, in-depth interviews and focus group discussions. Individual interviews were conducted with four levels of respondents (community members, district level health officials and service providers, province level health officials and service providers, and national health policy makers), and focus group discussions conducted with separate groups of men and women of reproductive age in each district.

Qualitative data collectors were men and women who spoke either Dari or Pashto and English. There were two qualitative data collection teams, one Dari and one Pashto, which consisted of two note-takers, one male and one female, and two interviewers, one male and one female. In addition, each team also had a supervisor who obtained community consent, identified participants in consultation with the community, and performed quality checks on interviews and discussions. To ensure consistent interpretation of study tools across languages and interviewers, all team members were trained using interview and focus group discussion guides tailored to each level of respondent. The rationale for each question was reviewed in training, as well as rapport building, probing techniques, observation and note-taking skills.

At the national level, five key informants with national-level responsibility for maternal health service implementation were identified in consultation with MoPH officials and international development agency representatives and invited for in-depth interviews. In each of the four provinces, four to six government officials and healthcare providers were selected for in-depth interviews, depending on the MoPH and health facility staffing structures for that province. In addition, men and women in three communities per district were invited to participate in focus group discussions, for a total of six focus groups per district; communities were selected to

represent a range of village size and accessibility within each district. As the aim of the broader study was to explore changes in maternal health over the past ten years, study teams attempted to identify men and women in each community who were of reproductive age during both 2002 and 2011 and who had resided in the same village or at minimum, the same region, during that time period. To encourage discussion and avoid social desirability bias, study teams attempted to construct groups that were uniform in social position for both men and women.

Each interview was conducted by two persons, one facilitating and the other taking notes. At the community level, all male interviews and focus groups were conducted by men and all female interviews and focus groups were conducted by females. Interviews followed a semi-structured format. Individual interviews lasted approximately 30 minutes and focus groups approximately 45 minutes, depending on the time the participants had available and their ability to offer answers. Informed consent was obtained from each participant prior to initiation of the interview. Permission to digitally record the interviews and discussions was obtained prior to recording and if permission was denied, detailed notes were taken by hand.

Critical to qualitative research is the use of researcher as the "research instrument" and the choices that s/he makes during data collection. After each interview was conducted, the interviewer and note-taker compared notes and debriefed with the supervisor. Debriefing included any challenges faced, as well as data collection team members perceptions of power relations within interviews and focus group discussions, as well as how study participants' and researchers' age, ethnicity, occupation and other factors such as the location and timing of interviews may have affected participants' responses.

Transcription and translation were conducted by data collection team members, then annotated with field notes and reviewed for accuracy and completeness by supervisors. Because male study

team members had stronger English skills, they conducted the majority of transcription and translation work. However, in some male team members' knowledge of English vocabulary related to experiences of labor and delivery was limited. To address this limitation, a senior Afghan project staff with midwifery training and fluent English skills provided ad hoc translation assistance and reviewed recordings and translated text of all interviews with government officials, health services providers, and women who discussed experiences of childbirth with obstetric complications.

Literature reviewed included national maternal health policies and protocols, as well as publically available reports from bilateral and multilateral health sector development partners, and unpublished program reports from NGOs working in each of the study districts. (See **Annex C** for a complete list of documents reviewed.) All data collected was organized in a database, and narrative reports or report sections organized in ATLAS.ti for annotation alongside individual and group interview findings.[79]

Analytical Methods

In-depth analysis was conducted using a primarily deductive Framework Analysis approach. Framework Analysis is a technique that was developed during the 1980s by the United Kingdom-based National Centre for Social Research, specifically for programmatic or policy-focused studies.[80] One important feature of the approach is that, unlike some other more inductive analysis approaches, it allows themes or concepts identified *a priori* to be specified as coding categories from the outset, and to be combined with other concepts or issues that emerge during the analysis process. A practical benefit of this approach is that it allows explanations generated by previous studies and issues identified in advance by program stakeholders to be explicitly and systematically considered in the analysis, but also leaves enough flexibility to identify and

incorporate issues that only become apparent during the analysis process.[80,81] Critical themes that emerged were explored in discussion with senior Afghan project staff involved in the data collection, translation and transcription processes, and findings triangulated with documentation of policy and program implementation in each district. Preliminary findings were then shared with key stakeholders to verify interpretation of results and relevance for health sector stakeholders in Afghanistan.

Role of the researcher

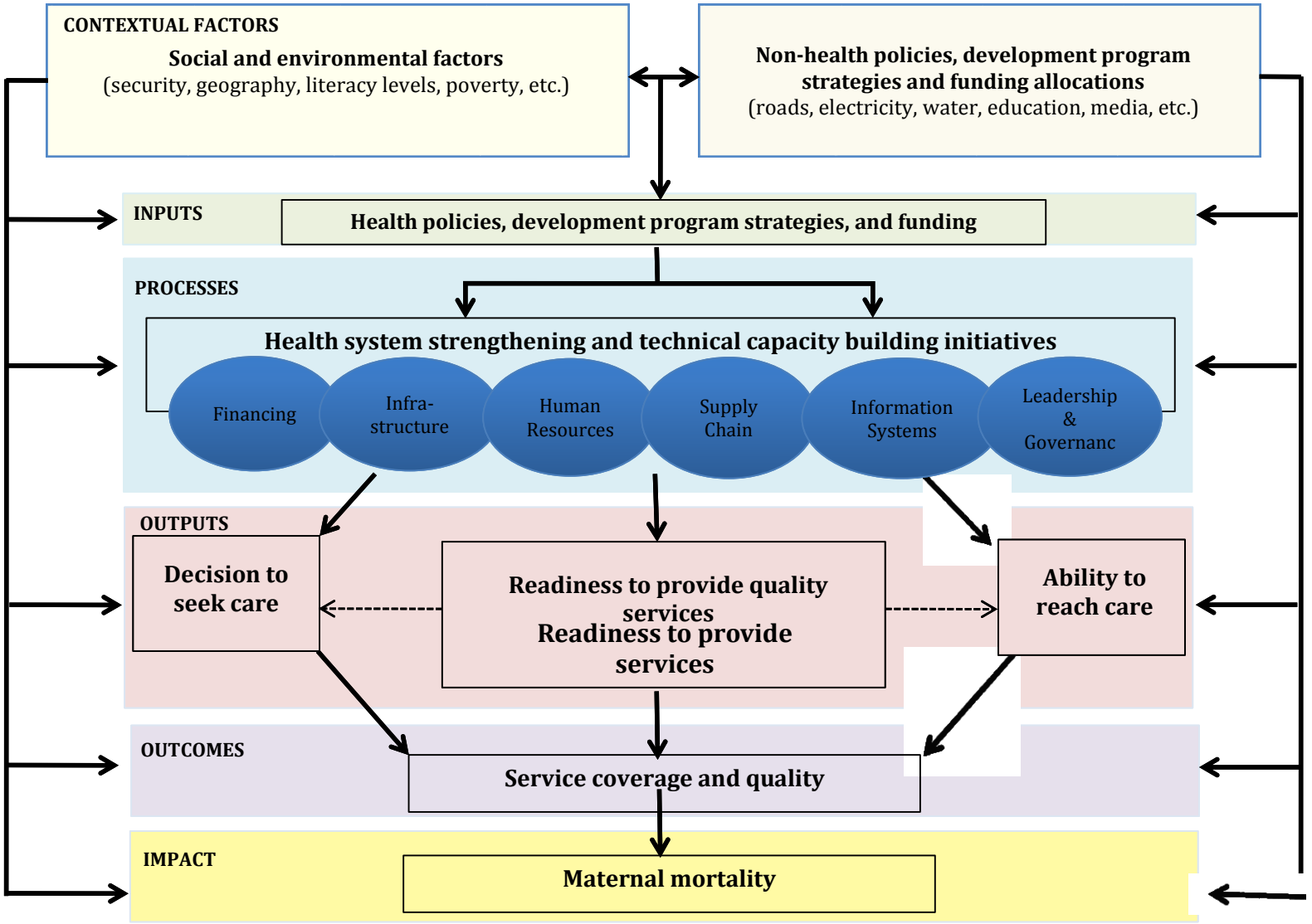
I first worked in Afghanistan during the summer of 2010, as an Advisor for Johns Hopkins Bloomberg School of Public Health's HIV Surveillance Project, providing monitoring and evaluation support to the Ministry of Public Health's National AIDS Control Program. Although I worked closely with colleagues involved in the Monitoring and Evaluation of Strengthening Health Activities for the Rural Poor (METASHARP) project responsible for conducting the annual National Health Services Performance Assessments and Results Based Financing Project baseline survey, I was not involved in any of the design, data collection or initial analysis of data sources used in Papers 1 and 2. I returned to Baltimore in late August 2010 as a first year DrPH student and soon began working as a Research Assistant on the RAMOS II project, tasked with leading qualitative research and historical documentation activities to assess reasons why maternal mortality may have declined in some areas of the country and not in others. I returned to Afghanistan many times over the next two years to oversee all aspects of this research, from designing research protocols to hiring and training study team members, overseeing data collection, transcription and translation, and sharing preliminary findings with MoPH officials and other health sector stakeholders. The research presented in Paper 3 is part of this study. Although I have not returned to Afghanistan since January 2012, I have continued to work on maternal health research there, providing remote technical assistance to Jhpiego, an affiliate of

Johns Hopkins University, for dissemination of national emergency and newborn care assessment findings, analysis of quality improvement program data, and research on health worker motivation and retention.

Ethical considerations

Paper 1 used data presented in reports published on the MoPH website and HMIS data that was declared as non-human subject research by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health. Paper 2 used de-identified data from a household survey that was approved by the institutional review board of Johns Hopkins Bloomberg School of Public Health (IRB # 2540) and the Afghanistan Public Health Institute of the Ministry of Public Health. Primary data collection for Paper 3 was conducted as part of a larger study, also approved by the Institutional Review Board of Johns Hopkins Bloomberg School of Public Health (IRB # 3139) and the Afghanistan Public Health Institute of the Ministry of Public Health.

Figure 3.1: Conceptual framework for strengthening health systems to reduce maternal mortality



Chapter 4 Scaling up skilled birth attendance with a Basic Package of Health Services in Afghanistan (Paper 1)

Abstract

In 2001, Afghanistan had essentially no functional health system and among the highest maternal mortality rates in the world. Since then, billions of dollars have been invested in socio-economic development, the Ministry of Public Health has led efforts to establish health care services across the country, and dramatic improvements in maternal health outcomes have been documented. This study uses routine health service data and evaluations of health system performance from 2006 through 2010 to assess the relationship between health system strengthening efforts and skilled birth attendance, a key intervention for reducing maternal mortality. Generalized estimating equations were used to assess trends over the four year period and linear regression models used to investigate the strength of the association between health system performance and institutional delivery. This study showed that the odds of skilled birth attendance significantly increased with improvements in overall health system performance. Although the national skilled birth attendance rate increased from 14% in 2006 to 26% in 2009/10, improvements varied at the provincial level. At the end of the study period, skilled birth attendance had dropped in one province, improved less than 5% in three provinces, and increased more than 25% in four provinces. When differences between provinces were taken into account, 53% the variation in skilled birth attendance across provinces was explained by health system performance. Findings confirm the importance of health system strengthening for reducing maternal mortality in conflict-affected settings like Afghanistan, and draw attention to the uneven progress in scaling up skilled birth attendance across the country. Disparities across provinces highlight the need for continued monitoring of sub-national trends and more in-depth analysis to understand how structural, programmatic and contextual factors contribute to differences in the success of health system strengthening efforts.

Introduction and background

There is global agreement that well-functioning health systems are needed to reduce maternal and newborn mortality and improve health.[8,82] There is less agreement, however, on what constitutes a functional health system in fragile, post-conflict states or on how to strengthen the capacity of a nascent or devastated health system to ensure that women with obstetric complications receive good quality medical treatment without delay.[11,83] Adaptation of general health system strengthening strategies is often hampered by limited human resources, weak government capacity, and lack of data to guide implementation in conflict-affected settings, making provision of essential health services an even greater challenge than in other low- resource settings.[36,39]

As the Institute for Development Studies cautions, rebuilding health systems in conflict-affected settings "involves a complex interplay between the specific context of a country, the dual aims of meeting short term health needs as well as longer term health system strengthening, the interest of the international aid community in specific countries and not in others, and the interests of the international donor community to invest in health".[84] Similarly, scaling up coverage of maternal health services requires consideration of context-specific supply and demand side barriers to service provision. On the supply side, the scale-up of service availability is dependent on the existence of a skilled workforce, the availability of equipment and supplies, and the management of systems to allocate resources, track their use, and monitor need.[64,65] On the demand side, physical and geographical barriers to service utilization are further complicated by socio-cultural factors at the individual, household and community level that may influence where, when and how women seek intrapartum care.[64,66]

An increasingly common first step in restoring health systems in countries emerging from civil conflict is to rapidly scale-up a set of cost-effective primary care services to address the country's priority health problems, often with non-governmental organizations (NGOs) contracted to deliver the agreed package of services while the government and international donors take

responsibility for stewardship and oversight of implementation.[85-89] For example, in Afghanistan, the Ministry of Public Health's (MoPH) primary strategy for strengthening its health system was the establishment of a Basic Package of Health Services (BPHS) for primary health care facilities. From the beginning of 2004, the MoPH contracted NGOs to provide BPHS services in 31 of Afghanistan's 34 provinces and adopted direct responsibility for service delivery in three small provinces near Kabul with financial support provided by international donors.[19] Alongside their support for service delivery, donors also supported pre-service education programs to train and graduate new midwives and technical assistance initiatives to strengthen the capacity of health facility staff and MoPH officials. With these initiatives and countless other targeted investments in development, the availability and quality of health care has improved considerably since 2002. The number of functional public health facilities has increased from fewer than 900 in 2002 to 1,790 in 2010,[19] 34 midwifery schools have been established, and the number of trained midwives in the country has increased from 467 in 2003 to approximately 2,200 in 2010.[90] Population based studies show improvements in the number of births attended by a midwife or doctor from less than 10% of all births in 2003 (6% rural, 35% urban)[91] to 19% in 2006 (rural areas only)[92] and 34% in (26% rural, 71% urban) in 2010.[93]

Two global studies examine the extent to which stronger health systems and contextual factors contribute to greater skilled birth attendance and reduced maternal mortality. Kruk and Prescott conducted a multi-level cross-sectional analysis of Demographic Health Surveys conducted since 1996 in 31 countries and found that national and community level factors, particularly health system characteristics, explained 66% of the variation in skilled birth attendance across countries, whereas individual-level factors like wealth status, education and parity explained only 16%.[32] Muldoon et al. used data from a number of publically available data sources to examine the relationship between proxy indicators for health system building blocks and maternal mortality, finding higher physician density (health workforce), sustainable access to water and sanitation

(infrastructure), and less corrupt government (leadership and governance) to be significantly associated with a lower maternal mortality ratio across 136 UN member countries.[33] No study to date, however, has examined the relationship between health system characteristics and maternal health indicators at a sub-national level, or the dynamics of these relationships over time, both of which are critical for drawing conclusions on improving health system strength and function in any context.

The objective of this paper is to explore the relationship between primary health care service package implementation and skilled birth attendance coverage in Afghanistan using routine data from the Ministry of Public Health and publically available third-party evaluations of health system performance from 2006 through 2010. Examining the use of maternal health services in complex settings like Afghanistan can inform national and international stakeholders about where to focus interventions that can reduce maternal mortality and improve health outcomes. A deeper understanding of how health systems contribute to maternal survival in conflict-affected countries is also needed to reduce mortality worldwide, as eight of the ten countries with the highest maternal mortality rates are considered fragile or conflict affected states.[83,94,95]

Methods

Variables and data sources

Outcome of interest: skilled birth attendance

Ensuring that all women give birth with a skilled attendant is one of the key strategies to reduce maternal mortality.[6] A skilled attendance strategy implies not only the presence of skilled health professionals with midwifery training but also an environment that enables them to perform capably, including access to higher levels of obstetric care in case of complications requiring surgery or blood transfusions. In practice, however, the term skilled attendant often denotes a

health professional (i.e. doctor, nurse, midwife), without any specification of skill level or the environment in which he or she operates.[96]

All United Nations organizations strongly advocate for "skilled care at every birth". The definition of a skilled attendant is "an accredited health professional – such as a midwife, doctor or nurse who has been educated and trained to proficiency in the skills needed to manage uncomplicated pregnancies, childbirth and postpartum care, and in the identification, management, and referral of complications in women and newborns."[7]

In Afghanistan, the primary strategy for increasing skilled delivery is to encourage routine delivery at a health care facility, with the assumption that this is proxy for delivering with a skilled attendant.[21] Calculating provincial level estimates of the proportion of births delivered at these facilities requires data from multiple sources. For the purposes of this study, the proportion of births delivered at primary health care facilities was calculated at the provincial level using secondary data available in the Ministry of Public Health's Health Management Information System (HMIS), launched nationwide in 2006, and from the Central Statistics Office.

- The numerator, the sum of the number of deliveries reported at basic health centers, comprehensive health centers and hospitals in each province in Afghan calendar years 1385, 1386, 1387, 1388/1389 (approximately 2006, 2007, 2008 and 2009/10), was taken from national Health Management Information System (HMIS) reports.
- The denominator, the estimated number of births in each province each year, was calculated by multiplying the provincial population projected by the Central Statistics Office for each year by the United Nations Population Division's estimate for Afghanistan's crude birth rate in that year.

Explanatory variables: health system performance and contextual factors

Since 2004, implementation of the BPHS has been assessed through Afghanistan's National Health Service Performance Assessment (NHSPA) which is conducted using a multi-stage stratified random sample of all health facilities providing the BPHS and systematic random samples of patients and health workers. This assessment, conducted by Johns Hopkins University in collaboration with the Indian Institute of Health Management Research and the Afghanistan MoPH, provides an overall measure of health system performance and patient care. The NHSPA employs a Balanced Scorecard tool to assess 29 performance indicators across six different domains based on BPHS guidelines and a series of workshops and discussions with the MoPH, NGOs, and other development partners active in the health sector, including front-line health workers and managers. Fourteen of the 29 indicators are indices created from an aggregate set of questions in the assessment tools, and all 29 indicators are converted to percentage scores ranging from 0 to 100. A provincial score is calculated for each indicator by weighting each facility score according to the distribution of facility types in the national sample, and calculating a weighted average for that province so that indicators that would be dichotomous variables at the facility level are compiled into weighted averages that form continuous variables at the provincial level. In addition to reporting the provincial score for each indicator, the Balanced Scorecard tool is color-coded to report whether provincial scores meet lower and upper benchmarks set for each indicator in 2004. Lower benchmarks were set at the level achieved by the 20% of provinces with the lowest scores for each indicator in 2004, and upper benchmarks set at the level achieved by the highest scoring 20% of provinces to indicate a realistic level of performance that could be achieved in Afghanistan.[97]

Overall health system performance can be measured in multiple ways. The Balanced Scorecard tool includes an overall health system performance mean score for each province that is calculated by averaging the 29 health system performance indicator scores. In addition, the

Balanced Scorecard tool reports the percent of upper benchmarks met by each province. Both the overall health system performance mean score and percent of upper benchmarks met, along with 21 indicators of health system performance from the four domains that were consistently measured over the study period (domains A, B, C and D), are included in this analysis to allow for examination of multiple aspects of health system performance[1]. These performance scores capture both supply and demand side determinants of health system performance, but do not account for contextual factors such as population density, remoteness or security. Thus, additional variables were identified from other sources to capture provincial characteristics. See **Table 4.1** for a list of health system performance domains and contextual factors considered in analysis, along with a brief description including data source and reason for inclusion or exclusion.

Trend analysis

Descriptive statistics were used to examine the extent and pattern of missing data and display the dispersion of the outcome and explanatory variables. Wilcoxon matched pair signed rank tests were used to measure the difference in health system performance indicators between 2006 and 2009/10, with pairs being baseline and endline performance scores for each province. Generalized estimating equations (GEE) with robust variance estimation and time as a predictor were then used to assess linear trends over the four year period. Wilcoxon matched pair signed rank is a non-parametric test of the null hypothesis that the medians for two matched distributions are equal.[98] GEE is an extension of parametric generalized linear modeling methods that adjusts for the correlation of individual responses by pooling together cross-sectional data to describe how

[1] There are 24 indicators in domains A, B, C and D. Three of the seven indicators in domain D (Service Provision) were not included in this analysis. Measurements for the average number of new outpatient visits per month (>750 visits or not) and average time spent with each patient (>9 minutes or not) were excluded due to lack of variation over the study period. Measurements for provision of delivery care services according to BPHS (yes/no) was excluded due to correlation with the outcome of interest.

the marginal distribution of the outcome varies as a function of the linear combination of covariates.[99]

Regression analysis

Two types of longitudinal models were then used to investigate the strength of the association between overall health system performance and institutional delivery. The percent of upper benchmarks met was selected as the primary measure of BPHS implementation used to assess the relationship between health system performance and institutional delivery because it takes into account baseline levels of performance and assigns equal weight to each indicator.

First, binomial logit GEE with exchangeable correlation structures and robust variance estimation were used to assess the average odds of institutional delivery across provinces with improvements in the percent of health system performance indicator benchmarks met. Because the outcome of interest, skilled birth attendance coverage, is measured as a proportion, GEEs were developed with a logit link and binomial family.[100] The exchangeable correlation structure was selected as the most parsimonious for these analyses based on 'Quasi-likelihood under the independence model criterion' (QIC).[101] Exchangeable correlation structures assume not only that responses are correlated at the individual level, but more uniquely that the degree of correlation between any two time-points is constant, regardless of the length of time or number of assessments between them. Hubert-White variance estimators were used to obtain semi-robust standard errors.[102]

Second, marginal and random effects linear regression models were used to assess the relationship between institutional delivery and the percent of health system performance benchmarks met when differences between provinces are taken into account. The marginal model is a population-average model. The random effects model analyzes error variance structures, assuming that the differences across provinces lie in their province-specific errors (not in their intercepts). The Breusch-Pagan Lagrange multiplier test was used to test the null hypothesis that

province-specific variances are zero and confirm that the random effect model is better suited to deal with heterogeneity in the data than pooled ordinary least squares regression, and the Hausman specification test used to confirm that province-specific effects were uncorrelated with regressors in the models and thus a fixed effect model would not be appropriate.[103]

Sub-analyses were conducted using unadjusted binomial logit GEEs to assess the relationship between institutional delivery and health system performance when the percent of benchmarks met is replaced by individual performance indicators. However, with only 29 of 34 provinces consistently included in the NHSPA from 2006 through 2009/10, the sample size (n=29, t=4), lacks necessary statistical power to incorporate multiple indicators of health system performance in the same model. Domain scores could be used as summary measures, but would give indicators in domains with fewer elements (i.e. domains A, B and D) greater weight than indicators in domains with many elements (i.e. domain C), and not account for underlying patterns in the data. Exploratory factor analysis was also considered as a method for reducing the number of explanatory variables by developing scales that capture key components of health system performance to use in regression models. First, the potential to develop a scale for each of the performance domains defined in the NHSPA was tested using Kaiser-Meyer-Olkin (KMO) tests of sampling adequacy, but domains A, B and D were determined not to be suitable for separate factor analyses (KMO = 0.5 in all three instances). When grouped together, samples for domains A and B combined (KMO=0.6) and C and D combined (KMO=0.7) met suitability criteria, but conceptually it does not make sense to group domains A and B as latent factors driving patient and provider satisfaction may be quite different. Finally, a hybrid approach was adopted, using individual health system performance indicators from domains A and B in a model with a service provision capacity scale developed using principal component extraction to assess underlying patterns in service provision capacity and service delivery (domains C and D).

All statistical analyses were conducted using Stata 11.[104]

Ethical considerations

This study was conducted as secondary data analysis, using publically available data presented in reports published on the MoPH website and HMIS data with no individual identifiers. Primary data collection protocol for the National Health Services Performance Assessment was reviewed by the Institutional Review Board of Johns Hopkins Bloomberg School of Public Health and determined to be non-human subjects research.

Results

Provincial characteristics

Table 4.2 presents characteristics of all 34 provinces in Afghanistan, documented at the midpoint of the study period. Mean (SD) health facility density per population and per geographic area were 5.7 (2.0) health facilities per 100,000 population and 3.7 (4.8) health facilities per 1,000 km^2, respectively. Health facility density per km^2 was highest in Kabul, the capital and most populous province with the best road access and highest literacy rate while health facility density per population was highest in Nooristan, the least populous province with extremely mountainous terrain, and poverty and illiteracy rates above the national average.

Institutional delivery trends

Figure 4.1 shows a map of Afghanistan identifying provinces by the magnitude of increase in the proportion of births recorded at healthcare facilities between 2006 and 2010. Across all 34 provinces, the proportion of expected births delivered at health facilities increased significantly from an average of 14% in 2006 to 26% in 2009/2010, with an average annual increase of 4.7% (CI: 3.4%, 5.9%). Improvement varied dramatically between provinces, however, with the greatest increase (from 15% to 57%) seen in the province with the lowest population density and health facility density per 1,000 km^2, Nimroz, and a decline in births delivered at health facilities

(from 38% to 22%) seen in Sar-i-pul, a mountainous province with the second lowest literacy rate in the country. The median percent of births delivered at health facilities across the 29 provinces consistently included in the NHSPA from 2006 through 2009/10 increased significantly from 18% in 2006 to 41% in 2008 ($p \leq 0.001$), and dropped to 36% in 2009/10.

Health system performance trends

Figure 4.2 shows a similar map, identifying provinces by level of improvement in overall health system performance mean score and percent of health system performance benchmarks met between 2006 and 2009/10. Across the 29 provinces consistently included in the NHSPA, the overall health system performance mean score increased from an average of 62% in 2006 to 70% in 2009/10, with an average annual increase of 2.6%. Farah, a sparsely populated province on the border with Iran, demonstrated the great increase in overall mean score from 49% to 73%, while seven provinces (Bamyan, Daykundi,Ghor, Kapisa, Logar, Sar-i-pul and Samangan) did not improve more than 5% and seven (Badakshan, Balkh, Kabul, Paktya, Panjsher, Parwan and Wardak) declined between 2 and 7%.

Similar trends are evident when health system performance is measured in terms of the percent of health system performance indicator upper benchmarks met. The percent of upper benchmarks met increased from an average of 44% across the 29 provinces in 2006 to an average of 56% met in 2009/10. The greatest increase was demonstrated by Badghis province, a northwestern province that had the lowest percentage of benchmarks met in 2006 (4%) and improved to meet 46% of benchmarks in 2009/10. Three other provinces (Farah, Herat, and Khost) demonstrated more than a thirty percent improvement in the number of performance benchmarks met, while five provinces (Badakshan, Kapisa, Logar, Paktya, and Samangan) did not improve more than 5% and five (Balkh, Kabul, Panjsher, Parwan and Wardak) declined between 8 and 29%.

Table 4.3 presents the percent change in skilled birth attendance and median health system performance scores across the 29 provinces consistently included in the NHSPA from 2006 through 2009/10. Like the median percent of expected births recorded at health facilities, the median overall health system performance score and percent of upper benchmarks met significantly improved between 2006 and 2008 ($p \leq 0.001$), but declined in 2009/10. The improvements in overall health system performance were likely driven by 10 of the 21 indicators that showed significant improvement ($p<0.05$) between 2006 and 2009/10, most of which also peaked in 2008. Of the ten indicators that showed significant improvement, nine were service-provision related indicators (infrastructure, equipment, drug availability, laboratory functionality, provider knowledge, availability of clinical guidelines, supply of family planning commodities, maintenance of active tuberculosis registers, and antenatal care provision) and the other was village health council activity.

Table 4.4 presents the average annual change in skilled birth attendance and health system performance across the 29 provinces consistently in the NHSPA from 2006 through 2009/10, as measured by general estimating equations with robust standard errors. Overall health system performance score increased an average of 2.6% (CI: 1.4, 3.7) per year between 2006 and 2009/10 and the percent of upper benchmarks met increased an average of 4.2% (CI: 2.1, 6.2). The largest average annual increases were seen in indicators for meeting minimum BPHS staffing requirements (7.9%; CI: 5.6-10.2%), maintenance of active tuberculosis registers (5.6%; CI: 3.6-7.6%) and for village health council activity (5.3%; CI: 2.3-8.4%).

Proportional odds of skilled birth attendance with improved health system performance

Table 4.5 presents estimated changes in the odds of skilled birth attendance coverage given improvements in the percent of upper benchmarks met across the 29 provinces of Afghanistan consistently covered in the NHSPA. Both unadjusted and adjusted population-level estimates

show that the odds of skilled birth attendance coverage significantly increase as the percent of health system performance benchmarks met increases. These estimates show that for the average province, the odds of skilled birth attendance coverage significantly improves with each increase in the percent of health system performance benchmarks met. Unadjusted estimates also show that the odds of skilled birth attendance coverage significantly increase with greater population and geographic density of functional health facilities but not poverty rate, literacy rate, road access, or security. The adjusted estimates show that this relationship between overall health system performance and skilled birth attendance coverage holds true when controlling for population and geographic health facility density. This means that assuming a standard number of health facilities per 100,000 population and 1,000 km^2, the odds of skilled birth attendance are 7% greater (2.78/2.61=1.07) for the average province meeting 70-79% of health system performance benchmarks than those meeting 60-69% of benchmarks, and 19% greater (3.31/2.78=1.19) for the average province with overall health system performance scores of 80-89% than those with scores of 70-79%.

Table 4.6 presents changes in the odds of skilled birth attendance coverage given improvements in individual health system performance indicators. Bivariate estimates show that the odds of skilled birth attendance coverage significantly increase above certain thresholds of performance in 12 of the 21 health system performance indicators, but the threshold and consistency of results with incremental improvements in health system component scores varied. Although incremental increases in patient perceptions of quality, health worker satisfaction, required staffing levels, and laboratory functionality were associated with greater odds of skilled birth attendance coverage, the most consistent increases in odds of skilled birth attendance coverage were associated with increases in required staffing levels, availability of clinical guidelines, and HMIS use.

Linear regression results

Table 4.7 presents population-average and random effects regression models illustrating the change in skilled birth attendance coverage given increases in health system performance benchmarks across the 29 provinces of Afghanistan consistently covered in the NHSPA. These multivariate models are consistent with the results of the binomial logit GEEs that show that the percent of health system performance benchmarks met and geographic health facility density are significantly associated with skilled birth attendance coverage. The adjusted models show that, assuming a standard level of population and geographic health facility density across provinces, for every one percent increase in the number of health system performance benchmarks met, the proportion of births delivered at public health facilities in a province increases by 0.2 percent (or for every five percent increase in the number of health system performance benchmarks met, the proportion of births delivered at public health facilities in a province increases by one percent). The intra-class correlation rho shows that 53% of the variance can be attributed to differences across provinces that are not captured by specific variables in the model.

Figure 4.3 provides a closer look at the association between skilled birth attendance and the percent of health system performance benchmarks met at a provincial level, with circles sized to reflect population. At the peak of skilled birth attendance coverage and health system performance in 2008, the only provinces with skilled birth attendance coverage above 50% and at least 75% of health system performance benchmarks met were Laghman and Logar, two eastern provinces with high health facility density per 1,000km^2. Laghman province, which borders Kabul to the east, demonstrated the largest increase in skilled birth attendance between 2006 and 2008, increasing from 7% in 2006 to 50% in 2008 while Logar, which borders Kabul to the south, maintained one of the highest levels of skilled birth attendance coverage throughout the study period, increasing from 35% in 2006 to 59% in 2008. The provinces with the lowest skilled birth attendance coverage and health system performance benchmarks met were Badghis, Daykundi

and Ghor, adjacent provinces with low geographic health facility density (in the lowest quartile) that consistently reported skilled birth attendance coverage below 20% and fewer than 50% of health system performance benchmarks met.

Results of sub-analyses illustrating the change in skilled birth attendance coverage given increases in summary measures for health system performance domains also suggested that skilled birth attendance is directly associated with health system performance related to general service provision capacity but not performance in areas of patient and community perspectives or staff satisfaction. The results of exploratory factor analysis and linear regression models using factor scores to represent aspects of health system performance are presented for reference in **Annex D**.

Discussion

Improving access to and quality of skilled attendance at birth, especially in low-income settings, is a global priority. There are a number of global and country-level initiatives aimed at supporting health system strengthening in low-income countries in order to scale up the availability and utilization of skilled care at delivery, and increasing attention to monitoring and addressing health systems inputs, processes and outputs that affect progress towards achieving the Millennium Development Goals for maternal health.[105] There is limited documentation, however, of why efforts are more successful in some areas than others or how to effectively tailor programming to local circumstances in conflict-affected settings.[36,106]

The BPHS in Afghanistan has been seen as a model for restoring health systems in countries emerging from civil conflict, and an example of how this approach can facilitate rapid increases in healthcare coverage, coordination, and standardization of services, facilities, staffing, drugs and equipment across the health system.[88,89] This study shows that in Afghanistan, improvements in overall health system performance are directly associated with improvements in skilled birth

attendance. Sub-analyses replacing overall health system performance measures with specific performance indicators suggest that health system performance in areas of service provision, including those not directly related to reproductive and maternal health care, was more strongly associated with skilled birth attendance than indicators for other areas of performance. Specifically, results showing increased odds of skilled birth attendance with improvements in adherence to staffing requirements, availability of clinical guidelines, and HMIS use suggest that these health system functions may be key areas for maternal health service delivery and health system strengthening programs to focus on in settings like Afghanistan. However, further research is needed to confirm this as the sample size for the study did not allow for sub-analyses examining the effects of multiple aspects of health system performance in the same model and health system performance indicators that appeared to have the strongest association with skilled birth attendance coverage are more objectively defined and less subject to courtesy bias than indicators of patient and provider satisfaction.

The differences between provinces illustrate that while the government of Afghanistan has made impressive gains in strengthening the capacity of the health system to improve service delivery, aggregated national-level data may hide substantial disparities. This is also consistent with conclusions from other studies that call for a focus on health system strengthening and monitoring progress at sub-national levels.[107,108] Variation across provinces was not explained by contextual factors in this analysis, although there is substantial evidence that women's educational attainment, social status, household wealth and decision-making power are associated with care-seeking behaviors for maternal health services and these have been found to be significant factors in health service utilization in other studies in Afghanistan.[62,93,109-112] It is possible that these factors did not help explain differences in skilled birth attendance in this analysis because measures aggregated at the provincial level do not sufficiently reflect variation, or because data was only available on most contextual factors at a single time point. The fact that random effect

models showed that such a high degree of variance is correlated with differences across provinces reinforces the importance of context-specific planning and suggests the need for more analyses with multi-level data sources that better capture provincial characteristics. In addition, process-tracing and systematic analysis of the structural, programmatic and contextual factors affecting decisions on place of delivery in provinces with both low and high levels of health system performance could provide insight into the reasons why BPHS implementation has been more successful in some areas of the country than in others.

The peak of the majority of indicators in 2008 is also of notable concern. There are a number of potential explanations for the decline of health system performance and skilled birth attendance between 2008 and 2009/10. First, the decline may suggest that the BPHS is an effective model for strengthening health systems and achieving rapid gains in maternal health service delivery in the short term, but increasing service coverage beyond an initial threshold will require a more complex strategy that takes into barriers to the supply and demand of services in areas where scale-up of services has been less effective. Second, it is possible that this decline is explained by factors associated with the end of the first round of multi-year BPHS contracts (2004 – 2008) and delays in issuance of contracts for the second round of contracts (2009 – 2012), as well as changes in the implementing NGO contracted in some areas. Finally, the decline could be reflective of changes in the working environment, but without repeated measures for contextual factors over the study period or information on other social, economic or political factors, it is difficult to examine the influence of contextual factors over time. Continued monitoring of performance and analysis of trends over time is critical to determine whether improvements in health system performance have stagnated or reversed, and to identify the conditions necessary for sustaining improvements achieved to date.

Strengths and limitations

Statistical analysis can only be as accurate as the data collected. The major limitation in this analysis is in the unknown quality and accuracy of the data sources. The provincial population figures that are used to estimate the number of births each year (the denominator for the proportion of institutional deliveries in each province) are projections produced by the Central Statistics Office, but as the most recent nationwide Afghanistan census was conducted in 1979, the accuracy of these figures is unknown.[113] In addition, the HMIS underestimates facility births if registers were not complete or HMIS reports not submitted from that facility in a regular and timely fashion. At the same time, it is possible that the HMIS overestimates facility births, especially in provinces where increased numbers of institutional deliveries is an indicator of health program success.

Another limitation is the lack of data available on changes in contextual factors over time or on skilled birth attendance and health system performance at sub-province levels. A more rigorous analysis accounting for different baseline levels and rates of change in health system performance measures or contextual factors would be possible with a more expansive dataset. HMIS reports are available at the facility level, but denominators would be difficult to identify with overlapping catchment areas and health system performance measures are not available for all facilities for all years. The 2006 Afghanistan Health Survey, 2007/08 National Risk and Vulnerability Assessment and 2010 Afghanistan Mortality Survey include population-based measures of skilled birth attendance. However, the sampling methods and recall periods differ in each study and do not allow for comparable disaggregation at the provincial level.

Finally, it is important to note that this analysis only covered 29 of Afghanistan's 34 provinces. Some of the most insecure provinces (i.e. Helmand, Kandahar, Paktika, Uruzgan, Zabul) were not included in the estimates because the working conditions in these areas precluded NHSPA data collection for most of the years of the study period. Understanding the dynamic interplay of

insecurity, health system inputs and maternal health service delivery in these settings is critical for addressing maternal mortality in Afghanistan but unfortunately beyond the scope of this study due to lack of data available for comparison.

Conclusion

In conclusion, this analysis confirms the importance of health system strengthening for improving safe delivery service coverage in conflict-affected settings like Afghanistan, Results show a direct relationship between overall health system performance and skilled birth attendance, suggesting that efforts to strengthen the health system as a whole may have a positive benefit on essential maternal health service uptake. That said, measures of service provision capacity, including those not directly related to reproductive and maternal health, were more strongly associated with skilled birth attendance than indicators for other areas of performance.

This study also highlights disparities in scaling up skilled birth attendance across provinces, and apparent decline in both health system performance and skilled birth attendance between 2008 and 2009/10. These disparities raise concerns about the sustainability of initial improvements and suggests the need for both continued monitoring of provincial level trends and more in-depth analysis in provinces with both low and high levels of skilled birth attendance to understand how structural, programmatic and contextual factors contribute to differences in the success of health system strengthening efforts across provinces.

Table 4.1: Health system performance and contextual variables considered for analysis

Indicator	Data Source	Description
SUMMARY SCORE		
Overall health system performance score	NHSPA	Average of 29 health system performance indicators that comprise domains listed below.
Percent of upper benchmarks met	NHSPA	Number of health system performance indicators meeting upper benchmarks set in 2004
DOMAIN SUB-SCORES		
Domain A: Patients and community perspectives	NHSPA	Average of 3 indicators, measuring patient satisfaction, patient perceptions of service quality and presence of an active village health council.
Domain B: Staff satisfaction	NHSPA	Average of indicators 2 indicators, measuring staff job satisfaction and the percentage of health workers reporting having received their salary in the month preceding the assessment.
Domain C: Capacity for service provision	NHSPA	Average of 12 indicators of facility readiness, measuring infrastructure, equipment functionality, laboratory functionality, drug availability, family planning availability, compliance with minimum staffing requirements, the proportion of staff attending in-service training, provider knowledge, availability of clinical guidelines, use of HMIS, completion of patient records and completion of a TB register.
Domain D: Service provision	NHSPA	Average of 7 indicators of service provision and clinical quality of care, measuring patient exam conduct, patient counseling conduct, proper sharps disposal, level of outpatient consultations per month, patient consultation time, provision of antenatal care and provision of delivery care services.
Domain E: Financial systems	NHSPA	Average of 2 indicators of financial system performance, measuring facilities with guidelines on user fees and facilities with exemptions for poor patients. Excluded due to discontinuation of user fees for BPHS facilities in 2008.
Domain F: Overall vision	NHSPA	Average of 3 indicators measuring the percentage of new outpatient visits by females, an outpatient concentration index and a patient satisfaction concentration index. Excluded due to lack of variation from year to year.
CONTEXTUAL FACTORS		
Functional facilities per 1,000 km^2	HMIS, AGCHO	Functional health facilities reported in HMIS each year divided by provincial area (x 1,000)
Functional facilities per 100,000 population	HMIS, CSO	Functional health facilities reported in HMIS each year divided by provincial population (x 100,000)
Poverty rate	NRVA	Percent of provincial population living below poverty line in 2007/08
Literacy rate	NRVA	Percent of provincial population that is literate in 2007/08
Average distance to road	NRVA	Average distance (km) to drivable road in 2007/08
Annual security incidents	CIMICweb	Security incidents reported by the Afghanistan NGO Safety Office in 2008

Table 4.2: Provincial characteristics

Province	Population	Area (km^2)	Health facilities per 100,000 population	Health facilities per 1,000 km^2	Poverty rate	Literacy rate	Average distance to drivable road (km)	Annual security incidents
Badakhshan	838,550	44,059	5.7	1.1	61.0	24.2	19.2	46
Badghis	437,600	20,591	5.8	1.3	41.7	8.2	2.5	298
Baghlan	796,750	21,118	5.1	1.9	18.0	24.2	2	162
Balkh	1,133,700	17,249	5.2	3.7	60.3	26.8	2.8	135
Bamyan	394,550	14,175	10.0	2.8	55.7	20.2	6	13
Daykundi	406,800	18,088	6.2	1.4	43.4	17.6	5.9	19
Farah	452,700	48,471	3.8	0.4	12.2	15.3	6.7	209
Faryab	876,600	20,293	4.1	1.9	29.1	18.2	5.6	215
Ghazni	1,083,150	22,915	5.7	2.8	19.0	30.8	3.2	1,001
Ghor	609,650	36,479	4.6	0.8	44.2	25.2	2.4	84
Helmand	814,650	58,584	4.6	0.7	8.9	12.0	0.7	1,004
Hirat	1,626,950	54,778	3.8	1.2	38.7	25.1	1.1	242
Jawzjan	472,350	11,798	5.3	2.2	14.5	15.9	24.9	61
Kabul	3,392,500	4,462	3.4	26.4	23.1	46.8	0.1	162
Kandahar	1,047,300	54,022	3.1	0.6	22.8	7.3	2.9	1,066
Kapisa	389,600	4,152	6.2	6.0	21.5	30.8	1.4	121
Khost	507,150	4,942	4.0	4.2	47.9	15.3	0.3	NR
Kunar	397,550	8,040	6.3	3.1	62.0	19.8	2	1,388
Kunduz	874,800	3,843	4.7	11.3	29.7	19.7	1.2	324
Laghman	393,450	3,880	5.9	6.2	66.8	25.6	0.9	172
Logar	345,950	9,934	9.6	3.4	75.0	30.3	0.4	NR
Nangarhar	1,321,450	7,727	6.0	10.8	33.0	22.8	0.6	400
Nimroz	140,500	41,005	4.4	0.2	24.5	16.7	8.9	122
Nooristan	130,750	9,225	10.8	1.5	49.8	14.1	10.9	75
Paktika	384,000	6,432	8.4	4.4	76.1	27.0	0.9	638
Paktya	486,650	19,482	5.6	1.4	60.6	11.5	0.4	336
Panjsher	135,550	3,610	8.9	3.5	22.6	27.5	2.8	1
Parwan	584,500	5,974	7.1	7.0	18.9	27.0	0.9	68
Samagan	341,350	11,262	5.6	1.8	55.1	23.0	4.6	16
Sar-i-pul	492,550	16,360	5.1	1.6	24.7	8.9	2.5	52
Takhar	863,200	12,333	6.1	4.3	36.6	16.7	3.5	103
Urozgan	309,250	12,696	2.3	0.7	40.8	9.0	4.3	276
Wardak	526,700	9,934	7.1	3.8	59.9	31.5	0.6	463
Zabul	268,250	17,343	4.1	0.8	37.4	18.6	1.7	300
Mean	684,618	19,272	6	4	39.3	21.0	3.96	299
SD	591,386	16,306	2	5	18.9	8.4	5.29	349
Median	489,600	13,436	6	2	38.1	20.0	2.45	167
Min	130,750	3,610	2	0	8.9	7.3	0.10	1
Max	3,392,500	58,584	11	26	76.1	46.8	24.90	1,388

Table 4.3: Percent change in skilled birth attendance and health system performance scores in 29 provinces of Afghanistan, 2006 – 2009/10

Variable	National Median Score				2006-2008		2008-2009/10		2006 - 2009/10	
	2006	2007	2008	2009/ 2010	Change	P-value	Change	P-value	Change	P-value
SKILLED BIRTH ATTENDANCE										
Percent of births at health facilities	18	29	41	36	23	**<0.001**	-5	0.304	18	**0.001**
HEALTH SYSTEM PERFORMANCE										
Overall BSC mean score	63	70	74	71	11	**<0.001**	-3	**0.023**	8	**0.001**
Percent of upper benchmarks met	42	58	63	58	21	**<0.001**	-4	0.109	17	**0.003**
Overall patient satisfaction	86	78	81	76	-5	0.297	-5	0.079	-10	**0.006**
Patient perception of quality score	80	77	81	78	1	0.663	-3	0.202	-2	0.297
Village health council activity	68	88	48	87	-20	**<0.001**	39	**0.028**	19	**0.008**
Health worker satisfaction index score	68	70	70	69	2	0.275	-1	0.323	1	0.749
Current salary payment	81	92	89	68	8	0.558	-21	**0.034**	-13	0.102
Infrastructure index	49	55	56	64	7	**0.037**	8	**0.018**	15	**<0.001**
Equipment functionality	80	84	88	88	8	**<0.001**	0	0.697	8	**<0.001**
Drug availability index	85	81	87	91	2	0.112	4	0.994	6	**0.033**
Family planning index score	84	94	94	93	10	**<0.001**	-1	0.064	9	**<0.001**
Laboratory functionality	43	58	65	60	22	**<0.001**	-5	0.371	17	**<0.001**
Required staffing score	66	64	73	91	7	0.253	18	**<0.001**	25	**<0.001**
Training index score	69	68	72	48	3	0.327	-24	**<0.001**	-21	**0.002**
Provider knowledge score	69	70	79	71	10	**<0.001**	-8	**<0.001**	2	0.460
Clinical guidelines index	63	79	84	82	21	**<0.001**	-2	0.581	19	**<0.001**
HMIS use index	78	92	92	79	14	**0.003**	-13	**<0.001**	1	0.423
Patient record index	70	71	70	65	0	0.370	-5	**<0.001**	-5	**0.001**
Tuberculosis register	38	51	59	55	21	**0.001**	-4	0.479	17	**0.001**
Patient history and physical exam index	83	84	84	76	1	0.385	-8	**0.006**	-7	**0.025**
Patient counseling	37	49	48	32	11	**0.010**	-16	**<0.001**	-5	0.081
Proper sharps disposal	79	85	75	72	-4	0.839	-3	0.382	-7	0.565
Antenatal care provision	85	96	96	93	11	**0.001**	-3	0.249	8	**0.018**

Table 4.4: Annual change in skilled birth attendance and health system performance in 29 provinces of Afghanistan, 2006 – 2009/10

	Annual mean score change, 2006-2008				Annual mean score change, 2006-2009/10			
Variable	**Coeff.**	**CI**	**SE**	**P-value**	**Coeff**	**CI**	**SE**	**P-value**
SKILLED BIRTH ATTENDANCE								
Percent of births at health facilities	**7.5**	(5.4, 9.5)	1.0	**<0.001**	**4.7**	(3.4-5.9)	0.7	**<0.001**
HEALTH SYSTEM PERFORMANCE								
Overall BSC mean score	**5.5**	(3.8, 7.2)	0.9	**<0.001**	2.6	(1.4-3.7)	0.6	**<0.001**
Percent of upper benchmarks met	**10.0**	(6.29, 13.77)	0.9	**<0.001**	4.2	(2.1. 6.2)	0.4	0.715
Overall patient satisfaction	-0.8	(-3.2, 1.6)	1.2	0.514	-1.2	(-2.5, .06)	0.7	0.062
Patient perception of quality score	0.5	(-1.5, 2.5)	1.0	0.619	-0.2	(-1.0, 0.7)	0.4	0.715
Written village health council activity	**11.1**	(6.7, 15.4)	2.2	**<0.001**	5.3	(2.3, 8.4)	1.5	**0.001**
Health worker satisfaction index score	1.3	(-0.5, 3.2)	1.0	0.162	-0.0	(-0.9, 0.8)	0.4	0.930
Current salary payment	0.9	(-5.9, 7.4)	3.3	0.782	-3.3	(-8.0, 1.4)	2.4	0.173
Infrastructure index	**3.4**	(0.5, 6.2)	1.4	**0.019**	4.6	(2.9, 6.4)	0.9	**<0.001**
Equipment functionality	**5.1**	(2.9, 7.2)	1.1	**<0.001**	3.4	(1.9, 4.8)	0.7	**<0.001**
Drug availability index	**2.5**	(0.0, 5.1)	1.3	**0.053**	1.9	(-0.3, 3.9)	1.1	0.084
Family planning index score	**4.4**	(0.7, 8.0)	1.9	**0.019**	2.4	(1.1, 3.7)	0.7	**<0.001**
Laboratory functionality	**9.4**	(6.1, 12.7)	1.6	**<0.001**	4.7	(2.7, 6.7)	1.0	**<0.001**
Required staffing score	2.2	(-0.7, 5.2)	1.5	0.139	7.9	(5.6, 10.2)	1.2	**<0.001**
Training index score	2.4	(-1.2, 6.1)	1.9	0.189	-4.3	(-6.7, -1.9)	1.2	**<0.001**
Provider knowledge score	**5.3**	(3.5, 7.1)	0.9	**<0.001**	1.1	(-0.2, 2.5)	0.7	0.108
Clinical guidelines index	**9.5**	(5.9, 13.0)	1.8	**<0.001**	5.7	(3.7, 7.7)	1.0	**<0.001**
HMIS use index	**9.1**	(5.0, 13.2)	2.1	**<0.001**	2.5	(-0.4, 5.4)	1.5	0.093
Patient record index	1.5	(-1.2, 4.1)	1.4	0.285	**-2.2**	(-3.9, -0.5)	0.9	**0.013**
Tuberculosis register	10.8	(6.5, 15.1)	2.2	**<0.001**	**5.6**	(3.6, 7.6)	1.0	**<0.001**
Patient history and physical exam index	0.6	(-1.8, 3.0)	1.2	0.627	**-1.3**	(-2.8, 0.0)	0.7	**0.050**
Patient counseling	**5.1**	(1.4, 8.8)	1.9	**0.007**	-1.8	(-4.1, 0.6)	1.2	0.150
Proper sharps disposal	2.5	(-4.2, 9.1)	3.4	0.467	-0.2	(-4.9, 4.5)	2.4	0.929
Antenatal care provision	**5.9**	(2.5, 9.3)	1.8	**0.001**	**3.2**	(1.3, 5.0)	1.0	**0.001**

Table 4.5: Proportional odds of skilled birth attendance with improvements in overall health system performance and contextual factors in Afghanistan, 2006-2009/10

	Unadjusted Odds Ratio (95% CI)*	Semi-robust SE	P-value	Adjusted Odds Ratio (95% CI)**	Semi-robust SE	P-value
POPULATION AVERAGE ESTIMATES						
Percent of upper benchmarks met (ref: 20-29 %)						
30-39%	2.25 (1.39, 3.63)	0.55	**0.001**	2.32 (1.36, 3.97)	0.63	**0.002**
40-49%	2.47 (1.65, 3.68)	0.51	**<0.001**	2.46 (1.54, 3.94)	0.59	**<0.001**
50-59%	2.52 (1.58, 4.01)	0.60	**<0.001**	2.49 (1.44, 4.31)	0.7	**0.001**
60-69%	2.60 (1.67, 4.05)	0.59	**<0.001**	2.61 (1.58, 4.31)	0.67	**<0.001**
70-79%	2.80 (1.86, 4.22)	0.59	**<0.001**	2.78 (1.73, 4.48)	0.68	**<0.001**
80-89%	3.35 (2.04, 5.50)	0.84	**<0.001**	3.31 (1.90, 5.76)	0.94	**<0.001**
ln(Facilities per 100,000 pop)	1.85 (1.04-3.28)	0.54	**0.035**	1.70 (0.90, 3.23)	0.56	0.086
Facilities per 1000km	1.02 (1.01-1.04)	0.01	**0.012**	1.03 (1.00, 1.05)	0.01	**0.028**
Poverty rate (% pop)	1.00 (0.99-1.02)	0.01	0.475	---	---	---
Literacy rate (% pop)	1.00 (0.98-1.03)	0.01	0.742	---	---	---
Average distance to road	0.99 (0.95-1.02)	0.02	0.454	---	---	---
Annual security incidents	1.00 (0.99-1.00)	0	0.527	---	---	---

Table 4.6: Proportional odds of skilled birth attendance with improvements in health system performance indicators, 2006-2009/10

	Unadjusted Odds Ratio (95% CI)*	Semi-robust SE	P-value
POPULATION AVERAGE ESTIMATES			
Overall patient satisfaction (ref: 50-59%)			
60-69%	2.06 (1.76-2.40)	0.16	**<0.001**
70-79%	1.92 (1.77-2.07)	0.08	**<0.001**
80-89%	1.86 (1.55-2.23)	0.17	**<0.001**
Patient perception of quality score (ref: 50-59%)			
60-69%	2.07 (1.51-2.82)	0.33	**<0.001**
70-79%	1.96 (1.69-2.27)	0.15	**<0.001**
80-89%	1.99 (1.62-2.46)	0.21	**<0.001**
Village health council activity (ref: 10-19%)			
20-29%	0.77 (0.56-1.04)	0.12	0.088
30-39%	1.22 (0.53-2.82)	0.52	0.632
40-49%	0.33 (0.24-0.46)	0.33	**<0.001**
50-59%	1.33 (0.76-2.33)	0.38	0.324
60-69%	0.93 (0.62-1.39)	0.19	0.726
70-79%	1.03 (0.81-1.30)	0.12	0.823
80-89%	1.26 (1.20-1.31)	0.28	**<0.001**
Health worker satisfaction index score (ref: 40-49%)			
50-59%	1.94 (1.76-2.16)	0.10	**<0.001**
60-69%	1.82 (1.58-2.11)	0.13	**<0.001**
70-79%	1.82 (1.32-2.53)	0.30	**<0.001**
80-89%	2.12 (1.52-2.95)	0.36	**<0.001**
Required staffing score (ref: 10-19%)			
20-29%	5.40 (4.05-7.19)	0.79	**<0.001**
30-39%	3.54 (2.66-4.71)	0.52	**<0.001**
40-49%	2.36 (1.94-2.88)	0.24	**<0.001**
50-59%	3.28 (2.48-4.34)	0.47	**<0.001**
60-69%	3.15 (2.68-3.70)	0.26	**<0.001**
70-79%	3.96 (2.94-5.34)	0.60	**<0.001**
80-89%	3.35 (2.18-5.17)	0.70	**<0.001**
Training index score (ref: 10-19%)			
20-29%	2.80 (1.83-4.28)	0.61	**<0.001**
30-39%	1.49 (1.02-2.15)	0.28	**0.037**
40-49%	1.07 (0.72-1.59)	0.22	0.749
50-59%	1.05 (0.77-1.44)	0.17	0.751
60-69%	1.17 (0.82-1.67)	0.18	0.379
70-79%	1.05 (0.75-1.47)	0.18	0.759
80-89%	0.98 (0.59-1.63)	0.25	0.950
Provider knowledge score (ref: 40-49%)			
50-59%	0.294 (0.19, 0.45)	0.06	**<0.001**
60-69%	0.22 (0.19, 0.26)	0.02	**<0.001**
70-79%	0.34 (0.29, 0.39)	0.02	**<0.001**
80-89%	0.39 (0.32, 0.47)	0.04	**<0.001**

	Unadjusted Odds Ratio (95% CI)*	Semi-robust SE	P-value
POPULATION AVERAGE ESTIMATES			
Current salary payment (ref: 10-19%)			
20-29%	0.66 (0.52-0.82)	0.07	**<0.001**
30-39%	1.03 (0.70-1.06)	0.21	0.875
40-49%	0.61 (0.35-1.06)	0.17	0.080
50-59%	0.97 (0.60-1.56)	0.24	0.894
60-69%	1.10 (0.77-1.57)	0.20	0.585
70-79%	0.76 (0.52-1.11)	0.15	0.161
80-89%	0.83 (0.57-1.21)	0.16	0.325
Infrastructure index (ref: 20-29%)			
30-39%	0.81 (0.49-1.37)	0.21	0.436
40-49%	0.87 (0.54-1.41)	0.21	0.569
50-59%	1.16 (0.72-1.87)	0.28	0.533
60-69%	1.24 (0.85-1.81)	0.24	0.273
70-79%	1.39 (0.92-2.09)	0.29	0.115
80-89%	1.46 (0.97-2.22)	0.31	0.073
Equipment functionality (ref: 50-59%)			
60-69%	0.90 (0.45-1.79)	0.31	0.764
70-79%	1.35 (0.78-2.33)	0.38	0.279
80-89%	1.41 (0.92-2.17)	0.31	0.117
Drug availability index (ref: 50-59%)			
50-59%	0.94 (0.43-2.06)	0.38	0.876
60-69%	0.97 (0.54-1.73)	0.29	0.916
70-79%	1.18 (0.99-1.41)	0.11	0.066
80-89%	1.32 (1.06-1.64)	0.15	**0.013**
Clinical guidelines index (ref: 30-39%)			
40-49%	1.94 (0.86-4.38)	0.81	0.112
50-59%	2.76 (1.32-5.74)	1.03	**0.007**
60-69%	2.23 (1.21-4.09)	0.69	**0.010**
70-79%	2.87 (1.47-5.62)	0.98	**0.002**
80-89%	3.54 (2.05-6.12)	0.99	**<0.001**
HMIS use index (ref: 10-19%)			
20-29%	3.14 (2.44-4.03)	0.40	**<0.001**
40-49%	0.83 (0.61-1.13)	0.13	0.235
50-59%	2.00 (1.38-2.78)	0.35	**<0.001**
60-69%	3.74 (3.29-4.24)	0.21	**<0.001**
70-79%	3.88 (2.84-5.29)	0.61	**<0.001**
80-89%	3.94 (3.14-4.93)	0.45	**<0.001**
Patient records (ref: 30-39%)			
40-49%	2.73 (2.07, 3.61)	0.38	**<0.001**
50-59%	2.80 (1.72, 4.57)	0.70	**<0.001**
60-69%	1.81 (1.54, 2.12)	0.15	**<0.001**
70-79%	1.70 (1.40, 2.06)	0.17	**<0.001**
80-89%	1.62 (0.96, 2.74)	0.43	**<0.001**
Patient history and physical exam index (ref: 40-49%)			
50-59%	0.48 (0.43-0.54)	0.03	**<0.001**
60-69%	0.52 (0.38-0.71)	0.08	**<0.001**
70-79%	0.60 (0.45-0.79)	0.09	**<0.001**
80-89%	0.57 (0.49-0.66)	0.04	**<0.001**

	Unadjusted Odds Ratio (95% CI)*	Semi-robust SE	P-value
POPULATION AVERAGE ESTIMATES			
Family planning index score (ref: 50-59%)			
60-69%	1.34 (0.69, 2.59)	0.45	0.384
70-79%	1.17 (0.83, 1.65)	0.21	0.371
80-89%	1.28 (1.17, 1.40)	0.06	**<0.001**
Laboratory functionality (ref: 10-19%)			
20-29%	0.81 (0.36, 1.84)	0.34	0.615
30-39%	0.97 (0.61, 1.55)	0.23	0.897
40-49%	0.99 (0.63,1.55)	0.23	0.964
50-59%	1.47 (0.97, 2.23)	0.31	0.069
60-69%	1.78 (1.27, 2.48)	0.30	**0.001**
70-79%	2.07 (1.41, 3.05)	0.41	**<0.001**
80-89%	1.9 (1.14, 3.16)	0.49	**0.013**
Patient counseling (ref: 10-19%)			
20-29%	0.88 (0.54-1.45)	0.22	0.620
30-39%	0.92 (0.66-1.29)	0.16	0.626
40-49%	0.92 (0.61-1.38)	0.19	0.678
50-59%	0.90 (0.62-1.30)	0.17	0.569
60-69%	0.80 (0.50-1.27)	0.19	0.339
70-79%	1.52 (0.80-2.91)	0.50	0.204
Proper sharps disposal (ref: 10-19%)			
20-29%	0.39 (0.23-0.66)	0.10	**<0.001**
30-39%	1.36 (0.81-2.30)	0.36	0.250
40-49%	1.98 (1.10-3.57)	0.60	**0.023**
50-59%	1.03 (0.54-1.93)	0.33	0.939
60-69%	1.46 (0.82-2.59)	0.43	0.198
70-79%	1.48 (0.88-2.51)	0.40	0.142
80-89%	1.40 (0.98-1.99)	0.25	0.063

Table 4.7: Linear regression analysis of relationship between skilled birth attendance and health system performance in Afghanistan, 2006 – 2009/10

	BIVARIATE POPULATION AVERAGE MODEL*				MULTIVARIATE POPULATION AVERAGE MODEL**			
	Unadjusted Coeff. (95% CI)*	**Semi-robust SE**	**P-value**		**Adjusted Coeff. (95% CI)***	**Semi-robust SE**	**P-value**	
Percent of upper benchmarks met	0.20 (0.08, 0.31)	0.06	**0.001**		0.20 (0.10, 0.31)	0.06	**<0.001**	
ln(Facilities per 100,000 pop)	11.62 (1.40,- 21.84)	5.21	**0.026**		11.04 (0.50, 21.58)	5.37	**0.040**	
Facilities per 1000km	0.43 (0.06, 0.79)	0.19	**0.021**		0.53 (-0.14, 1.19)	0.34	**0.123**	
Poverty rate (% pop)	0.08 (-0.15, 0.32)	0.12	0.484		-----	-----	-----	
Literacy rate (% pop)	0.08 (-0.39, 0.55)	0.24	0.743		-----	-----	-----	
Average distance to road	-0.24 (-0.83, 0.36)	0.3	0.44		-----	-----	-----	
Annual security incidents	0.00 (-0.01, 0.01)	0	0.54		-----	-----	-----	
	BIVARIATE RANDOM EFFECTS MODEL*				**MULTIVARIATE RANDOM EFFECTS MODEL****			
	Unadjusted Coeff. (95% CI)*	**Semi-robust SE**	**P-value**	**Rho**	**Adjusted Coeff. (95% CI)***	**Semi-robust SE**	**P-value**	**Rho**
Percent of upper benchmarks met	0.19 (0.08, 0.31)	0.06	**0.001**	0.47	0.18 (0.07, 0.29)	0.06	**0.001**	
ln(Facilities per 100,000 pop)	11.86 (1.63, 22.09)	5.22	**0.023**	0.49	11.26 (-0.93, 23.45)	6.22	0.07	0.53
Facilities per 1000km	0.47 (0.11, 0.84)	0.19	**0.011**	0.51	0.51 (0.11, 0.92)	0.21	**0.014**	
Poverty rate (% pop)	0.08 (-0.15, 0.32)	0.12	0.486	0.46	-----	-----	-----	
Literacy rate (% pop)	0.08 (-0.40, 0.55)	0.24	0.744	0.47	-----	-----	-----	
Average distance to road	-0.24 (-0.83, 0.36)	0.3	0.437	0.47	-----	-----	-----	
Annual security incidents	0.00 (-0.01, 0.10)	0	0.537	0.37	-----	-----	-----	

** Separate models for each variable: xtreg sba var, pa* (population average model), *xtreg sba var, re* (random effects model)

*** Combined models for both performance variables adjusted for ln(health facility coverage per 100,000 population) and health facility density per 1,000 km*

Figure 4.1: Increases in skilled birth attendance rate in Afghanistan between 2006 and 2009/10, by province

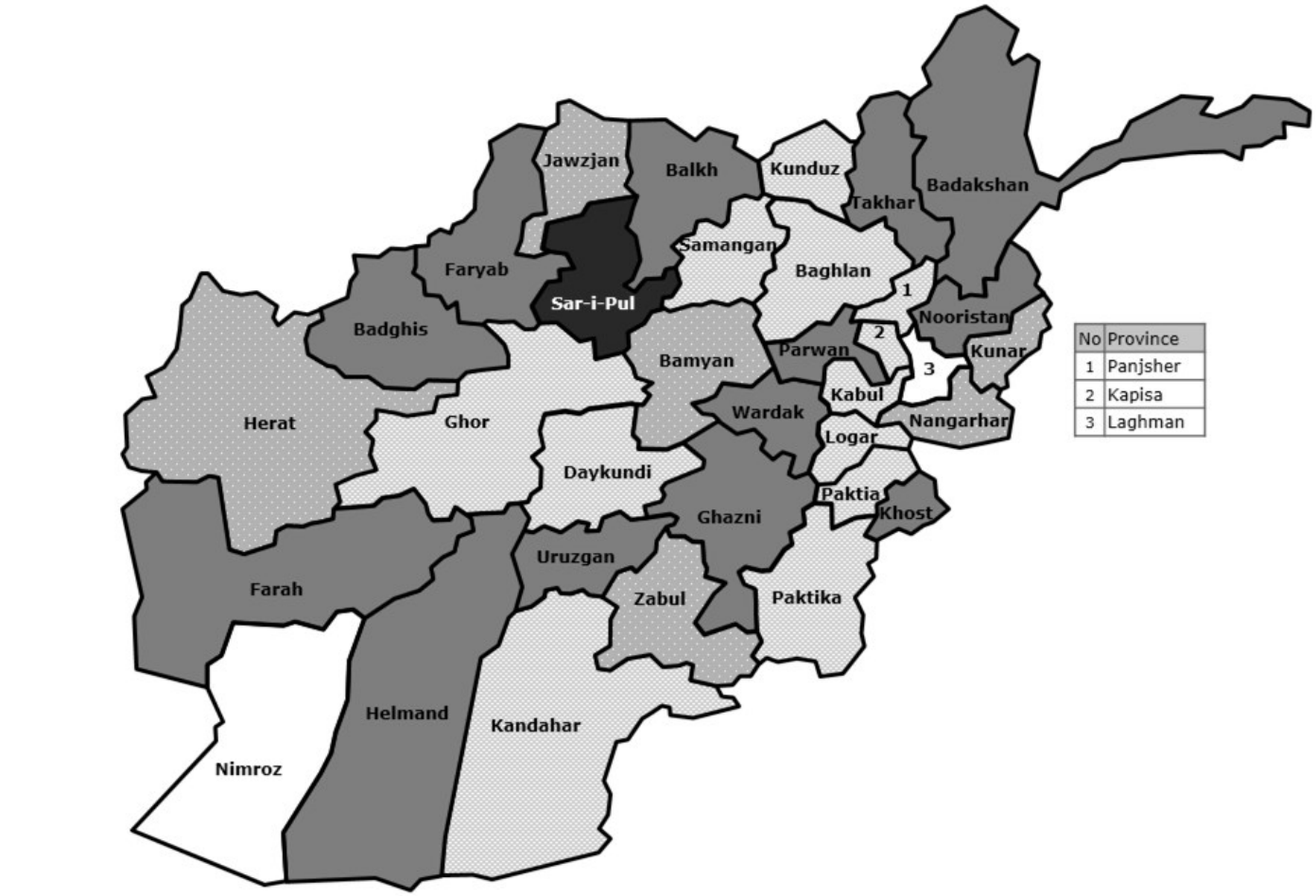


Figure 4.2: Improvements in overall health system performance in Afghanistan between 2006 and 2009/10, by province

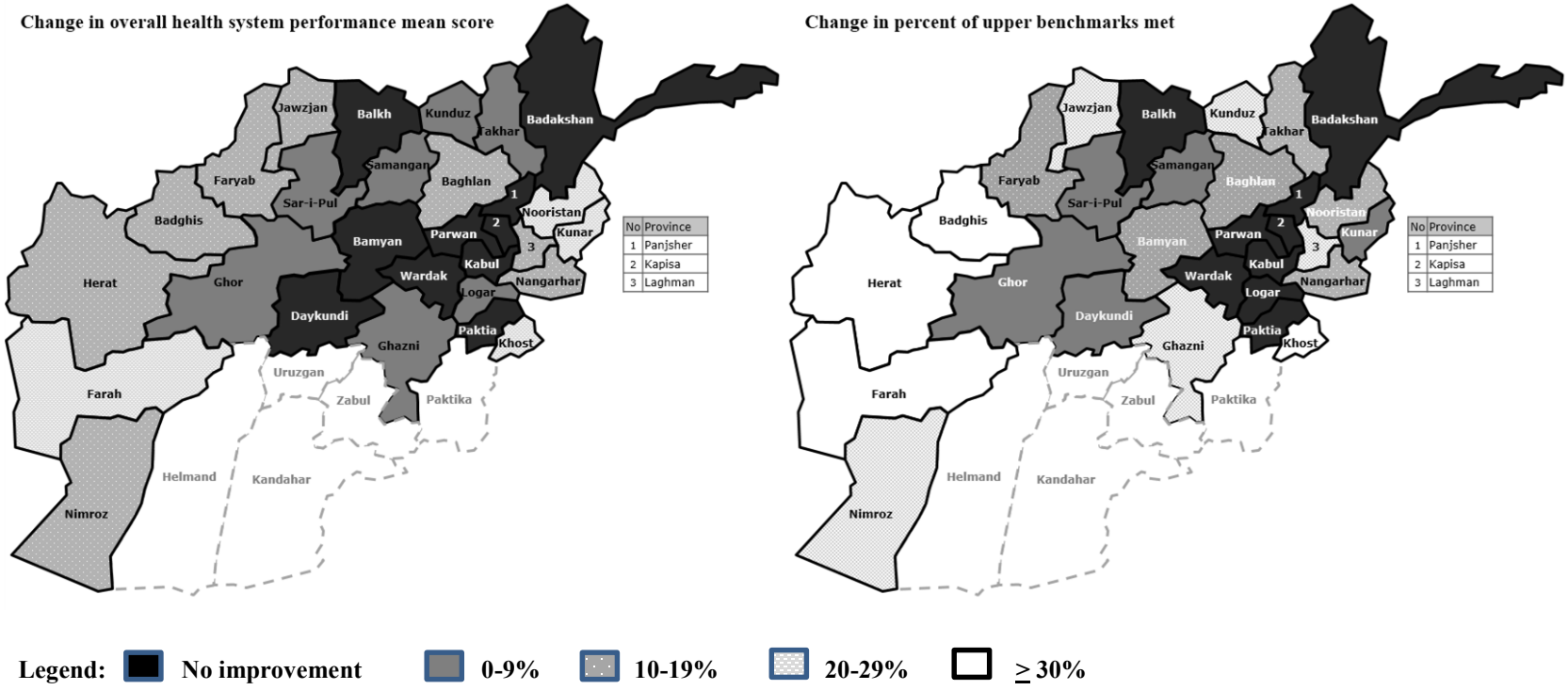
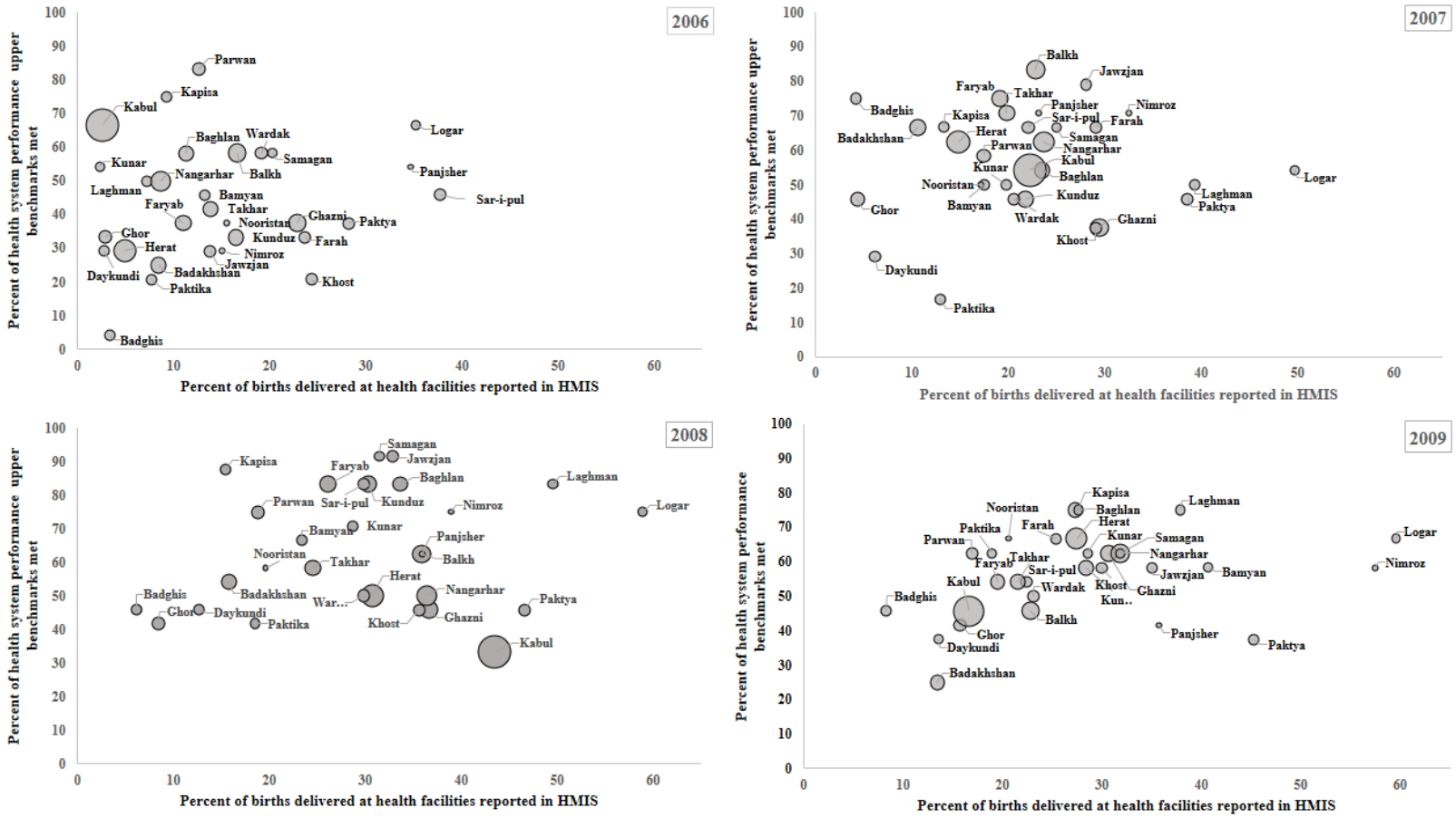


Figure 4.3: Skilled birth attendance and percent of health system performance benchmarks met by province, 2006 – 2009/10



*Size of circle represents provincial population

Chapter 5 Determinants of skilled birth attendance in nine provinces of Afghanistan: a multi-level analysis (Paper 2)

Abstract

Dramatic improvements in skilled birth attendance in Afghanistan over the last decade have been attributed to investments in health infrastructure, midwifery training and deployment, and provision of a standardized package of priority health services. Substantial disparities exist within the country, however, and the vast majority of women still do not have access to consistent, high quality intrapartum care. The objective of this study is to examine the determinants of skilled birth attendance in nine provinces in north-central Afghanistan and assess the extent to which health system factors contribute to the individual likelihood of skilled birth attendance. Data from a 2010 household survey and routine national data sources were linked and hierarchical logistic regression models used to assess the determinants of skilled birth attendance on multiple levels. This study did not show any direct linkages between health facility characteristics and an individual woman's likelihood of skilled birth attendance, but provided insights into why studies assuming that women seek care at the nearest primary health care facility may lead to misinterpretation of care-seeking patterns. This study identified a significant gap between women who receive skilled antenatal care and those who received skilled delivery care, and that the majority of women that do seek care bypass the nearest primary health care facility to deliver at hospitals or private clinics. Identifying positive-deviant behaviors of women with at least one skilled antenatal care visit that elect to deliver with a skilled attendant and reasons why women bypass primary care facilities for intrapartum care could improve targeting of safe motherhood interventions and efforts to strengthen community-facility linkages to increase utilization of essential maternal health services in north-central Afghanistan.

Introduction and background

In 2010, there were an estimated 342,900 maternal deaths globally, a decline from 409,100 in 1990.[1] In Afghanistan, the maternal mortality rate declined from 1,300 per 100,000 live births in 1990 to 460 per 100,000 live births in 2010. Despite the 65% reduction over the last two decades, pregnancy related deaths remain a leading cause of mortality (41%) for women of reproductive age and Afghanistan remains one of the ten countries contributing 60% of the global burden of maternal mortality.[25] Under current conditions, a woman in Afghanistan has a 1 in 32 chance of dying from pregnancy related causes in her lifetime, compared with 1 in 110 in Pakistan, 1 in 430 in Tajikistan and 1 in 2,400 in the United States.[114]

Empirical evidence shows that the use of maternal health services helps in reducing maternal morbidity and mortality, and the decline in maternal mortality in Afghanistan is attributed in large part to increases in skilled birth attendance achieved through investments in health infrastructure, midwifery training and deployment, and provision of a standardized package of priority health services.[93,115] Substantial disparities exist within the country, however, and the vast majority of women still do not have access to consistent, high quality maternal health care.[93] Sustaining improvements in national-level health indicators will not be possible without in-depth understanding of how supply and demand-side factors influence service uptake and how these vary across both geographic areas and socio-economic groups within Afghanistan.[107]

Scale-up of any health service depends on understanding the complex interplay of factors that influence utilization. Much of the research on skilled birth attendance explores predisposing and enabling factors at an individual or household level.[72] However, health services are provided within a broader provincial and national context, and little is known about the interplay between contextual factors and individuals' delivery decisions. Kruk and Prescott conducted a multi-level cross-sectional analysis of Demographic Health Surveys in 31 countries and found that national

and community level factors, particularly health system characteristics, explained 66% of the variation in skilled birth attendance across countries, whereas individual-level factors such as wealth status, education and parity explained only 16%.[32] Other studies using multilevel models find that delivery service use is highly clustered within families, communities and districts, but very few investigate the influence of supply side health facility or health system factors.[72,116-122]

Only two large-scale studies of the determinants of skilled birth attendance have been conducted in Afghanistan. The first study, presenting cross-sectional data from a 2004 survey of 9,917 women around 617 health facilities found household wealth status to have a stronger association with skilled birth attendance than any other household or facility characteristic studied, including whether facilities were equipped to provide life-saving maternal health services.[109] The second study, which analyzed data from a 2006 survey of 8,320 rural households in 29 provinces, found household wealth status, education, parity and presence of a female community health worker to be associated with skilled birth attendance but did not examine any other health system characteristics.[123] Both of these studies were conducted before many efforts to strengthen Afghanistan's health system had been fully implemented, however, and no follow up analysis has been conducted to investigate factors influencing a skilled birth attendance now that current health system development programs have been underway for nearly a decade.

The objective of this study is to build on previous research by exploring the determinants of skilled birth attendance and to assess the extent to which health system factors contribute to the individual likelihood of essential maternal health service utilization.

Methods

Study setting

Rebuilding and strengthening the health sector, with a specific focus on improving the health of women and children, has been among the top priorities of the Afghan government since the

Taliban was removed from power in late 2001. With support from international development partners and non-governmental organizations, the Ministry of Public Health (MoPH) has made great strides in establishing and implementing a standardized Basic Package of Health Services (BPHS) for primary care facilities and Essential Package of Health Services (EPHS) for district, provincial, regional and national hospitals. Together, the BPHS introduced in 2003 and EPHS introduced in 2005 define the Afghan health system's entire referral system, from the health post at the village level to tertiary care in major urban centers. Periodically updated guidelines provide instruction on how each level of primary care facility and hospital should be staffed, equipped, and stocked with supplies necessary for a standardized package of high-impact cost-effective services.[124,125]

From the beginning of 2004, the MoPH has contracted national and international non-governmental organizations (NGOs) to provide BPHS services in 31 of Afghanistan's 34 provinces and adopted direct responsibility for service delivery in three small provinces near Kabul (Kapisa, Panjshir and Parwan) with financial support provided by the United States Agency for International Development (13 provinces), the World Bank (11 provinces, including the three managed by the Ministry of Public Health) and the European Commission (10 provinces).[19] Each NGO contracted is expected to operate all public health facilities in an entire province or cluster of districts within a province by providing BPHS services under the supervision of donor contract managers and provincial MoPH offices. Contracting arrangements vary slightly across the donor agencies, particularly with regards to the inclusion of performance-based elements, monitoring and evaluation mechanisms and centralization or decentralization of essential drug and supply procurement.[18,57,126-128]

Alongside support for BPHS and EPHS implementation, international donors have funded a number of initiatives focused on increasing the availability, accessibility and utilization of essential maternal health services in Afghanistan. These include establishing community

midwifery education schools to increase the number of skilled birth attendants available for deployment to public health facilities, upgrading primary health care facilities to include obstetrician/gynecologists and surgical theaters in areas without a district hospital, establishment of maternity waiting homes to provide accommodation and clinical services to women from remote areas, piloting a demand side financing that provides conditional cash transfers to households for institutional delivery, and piloting supply side financing mechanisms that provide incentive payments to health care workers or facilities based on improvement in key health indicators.[22,26,129-131]

Data sources

2010 Household Survey

A household survey was conducted in nine provinces in 2010 to collect baseline information on the coverage of health services in the catchment areas of health facilities selected for a Results Based Financing intervention, including information on maternal health service utilization.[2] The nine provinces (Badakhshan, Balkh, Bamyan, Jawzjan, Panjsher, Parwan, Samangan, Saripul and Takhar) purposively selected to include different health services contracting, funding and implementation arrangements, are illustrated in **Figure 5.1**. A total of 6,879 households were selected using multi-stage probability sampling stratified by facility type, village and household. First, all health facilities in the nine provinces were stratified by facility type, and a number of health facilities were randomly selected. Then, two villages were randomly selected from the list of all villages within two-hours walking distance of each of the selected facilities. Finally, using a

[2] Eleven provinces were purposively selected for implementation of a multi-donor trust fund supported Results Based Financing project, but the 2010 household survey was not conducted in Kandahar or Kunduz due to security concerns.

household listing conducted prior to the survey, an average of 24 households were selected in each of the villages using simple random sampling.

The household survey consisted of two questionnaires: a Head of Household Questionnaire and a Female and Child Health Questionnaire. The Head of Household Questionnaire included questions on household membership and demographics, assets, care-seeking behavior and health expenditure while the Female and Child Health Questionnaire covered women's pregnancy history, antenatal and delivery care experiences, children's immunization history, recent experiences with childhood illness and patient satisfaction. Although the survey was designed to assess the reach of services in the nine provinces, not the underlying determinants of utilization, the package of information collected provides a unique opportunity to explore the determinants of skilled birth attendance in relatively safe and secure provinces of Afghanistan.

National data sources

Information on the public health system in the nine provinces covered by the 2010 Household Survey was collected from two Ministry of Public Health data sources: the national Health Management Information System (HMIS) and the 2009/10 National Health Service Performance Assessment Balanced Scorecard Report for BPHS facilities, produced by Johns Hopkins Bloomberg School of Public Health in collaboration with the Indian Institute of Health Management Research and the Afghanistan MoPH.[21]

Variable selection

Outcome of interest: skilled birth attendance

The main outcome of interest for this study is the odds of skilled birth attendance for ever-married women aged 15 to 49 living in BPHS facility catchment areas (n=3,321) with a live birth in the 24 months preceding data collection for the 2010 Household Survey. In Afghanistan,

skilled birth attendance is defined as a delivery attended by a female doctor or midwife. Given the cultural context of Afghanistan, male physicians may not have been given the opportunity in training to adequately develop their obstetric skills and are therefore not considered to be skilled attendants.[132]

Exploratory variables: individual, health facility, and provincial characteristics

Variables extracted from the 2010 Household Survey database include: women's ages (divided into five year categories), highest education level completed (none, primary, secondary), literacy (yes/no), household wealth status (wealth quintile based on index scores constructed for each household using principal component analysis of household assets, income sources and housing characteristics), gravidity, history of pregnancy loss (if any previous pregnancies ended in spontaneous abortion or stillbirth), whether a woman had a least one skilled antenatal care visit during her most recent pregnancy, who made the decision about place of delivery, and reasons for not delivering at a health facility in the event of a home delivery.

Health facility characteristics extracted from the HMIS include the name of the donor agency supporting BPHS services, contracting mechanism (World Bank performance-based partnership agreements with NGOs, World Bank Strengthening Mechanism agreements with provincial Ministry of Public Health offices, United States Agency for International Development performance-based grants), and number of functional health facilities for each of the nine provinces, as well as the agency responsible for service delivery and inclusion of facility

catchment population in a GAVI supported demand-side financing project providing conditional cash transfers for delivery at public primary health care facilities if applicable.[3]

Two indicators of provincial health system performance were extracted from the 2009/10 NHSPA Balanced Scorecard Report: overall provincial health performance score and percent of health system performance targets met. Provincial scores are based on a multi-stage stratified random sample of all health facilities providing BPHS services and systematic random samples of patients and health workers at each facility. Health system performance is reported using a Balanced Scorecard tool to present scores for 29 health system performance indicators based on BPHS guidelines and extensive stakeholder consultation. In addition to reporting the provincial score for each indicator, the Balanced Scorecard tool is color-coded to report whether provincial scores meet targets set for each indicator in 2004. Health system performance is reported as an overall mean score for each province, calculated by averaging the 29 health system performance indicator scores and as a percentage of targets met.[8] Because only 53% of the facilities included in the 2010 Household Survey sample were covered by the National Health Service Performance Assessment in 2009/10, performance data could not be dissagregated to a facility level.

Statistical analysis

Exploratory data analyses were conducted to examine the extent of missing data and dispersion of the outcome and explanatory variables. Bivariate analyses were then conducted to examine the nature of association between study sample characteristics and skilled birth attendance. Descriptive statistics and bivariate analyses were computed using Stata's *SVY* command to

[3] At the time of the survey, GAVI Health System Strengthening (GAVI-HSS) was supporting district-level implementation and evaluation of demand-side financing schemes for maternal health outcomes in four provinces of Afghanistan, one of which (Badakshan) was included in the 2010 Household Survey.

account for the complex design and nested structure of the data. This command allows observations to be weighted by the inverse probability of a woman's selection and standard errors to be computed using Taylor linearization to account for survey design.[98]

Because respondents living in the same facility catchment area are more likely to be similar to each other than they are to respondents in other facility catchment areas, and some determinants of skilled birth attendance may be a function of conditions in that area or the surrounding province, multilevel modeling techniques were used to assess the association between study sample characteristics and skilled birth attendance. Two-level random intercept models were fit using maximum likelihood estimation with adaptive quadrature to assess the influence of measured individual/household and facility characteristics on the utilization of skilled birth attendance. Random intercept models recognize the hierarchical structure of population survey data by allowing residual variance to be partitioned into between cluster and within-cluster components.[103] In this case, it allowed for measurement of the variance between facility catchment areas as well as the measurement of the variance within facility catchment areas at the individual/household level.

Models were estimated with variables which had statistically significant associations with skilled birth attendance in bivariate analyses or had a p-value ≤ 0.2. Multicollinearity was assessed using Stat's c*ollin* command, and variables for education, health system performance and donor were excluded from consideration in the models due to their high levels of correlation with literacy and province, respectively. The following four models were estimated:

Model 1: Null (empty) random-intercept only model with no explanatory variables

Model 2: Random-intercept model with only individual/household level variables

Model 3: Random-intercept model with only facility level variables

Model 4: Random-intercept model with individual/household and facility-level variables

Akaike Information Criterion (AIC), Bayesian Information Criteria (BIC) and log likelihood values were examined to determine the most appropriate model for skilled birth attendance with the explanatory variables available.[103] Final model fit was then tested by plotting predicted values against individual/household and facility level residuals. Correlations between the probability of skilled birth attendance in the same facility catchment area was computed using a variance partition coefficient ($VPC_f = \sigma^2_f / (\sigma^2_f + 3.29)$) where σ^2_f is a measure of variance at the facility level. All statistical analyses were conducted using Stata 11.[104]

Ethical considerations

This study was conducted as secondary data analysis, using a version of the 2010 Household Survey dataset with personal identifiers removed as well as information from publically available datasets containing health facility and provincial characteristics. Primary data collection for the 2010 Household Survey was approved by the Institutional Review Board of Johns Hopkins Bloomberg School of Public Health (IRB # 2540) and the Afghanistan Public Health Institute of the MoPH.

Results

Study sample characteristics

Characteristics of provinces covered and health facilities selected for the 2010 Household survey are presented in **Table 5.1** and **Table 5.2,** respectively. Because the study sample was stratified by facility type, not by province, there was a significant difference in the number and type of facilities selected in each province. Contracting mechanisms are determined at a provincial level, and therefore also differed significantly by facility type. Approximately half of the health facilities included in the sample were managed by Afghan NGOs, one-quarter by international

NGOs and one-quarter by the MoPH. Only four percent of facilities, all sub-centers, participated in demand side financing programs.

Socio-demographic characteristics and pregnancy-related information about women included in the study sample are presented in **Table 5.3.** Of the 7,797 women interviewed in the 2010 household survey, 3,321 were married women living in primary health care facility catchment areas that had delivered a child within the past two years and were included in this analysis. Approximately half of the study sample consisted of women aged 20-29, with a mean age of 28.2. The vast majority of women were illiterate with no education. Only 6.1% had any primary or secondary education and only 4.6% could read. The vast majority had also given birth to at least one child prior to their most recent delivery. Approximately 40% of women reported having had experienced a miscarriage or stillbirth during a previous delivery.

Although nearly 60% of women had at least one antenatal care visit with a skilled provider, only 25.4% reported having a skilled attendant at delivery, nearly all of which (92.0%, n=774) took place at a hospital or clinic. Of the women who delivered with a skilled attendant, 30% (n=249) delivered at the clinic whose catchment area they were identified in for the 2010 Household Survey, 59% (n=498) bypassed that facility to deliver elsewhere, and 8% (n=63) delivered at home. Location of delivery was not stated in 3% of cases that reported delivering in the presence of a skilled attendant (n=27). **Figure 5.2** presents the place of delivery for women utilizing skilled birth attendants by designated catchment area. Of the women who bypassed the closest primary healthcare facility to deliver elsewhere, 71% (n=339) delivered at a public hospital (i.e. district hospital, provincial hospital, regional hospital or specialized maternity hospital), 20% (n=98) delivered at a private hospital, and 9% (n=42) delivered at another sub-center, basic health center, or comprehensive health center.

Women who reported home births without a skilled attendant provided many reasons for not delivering at a clinic or hospital. The reasons women provided for not delivering at a health facility are illustrated in **Figure 5.3.** The most common reasons for not delivering at a health facility were distance and lack of transport (58.1%), followed by transport being too expensive (43.5%) and not thinking institutional delivery was necessary (24.8%). Other reasons included services being too expensive (21.3%), lack of a female skilled birth attendant at the facility (13.0%), unfriendly staff at the facility (13.0%), religious beliefs (8.7%), inconvenient service hours (6.9%), lack of a male family member to accompany then (5%), and security concerns (3.4%). There were no significant differences in reasons for home delivery between women who received skilled antenatal care and those who did not.

Slightly more than half of women (54.8%) reported that their husband made the decision about where the delivery should take place and 31.2% reported that they made the decision themselves. Other women reported that their mother-in-law, father-in-law, friends, community health workers or other family members selected the place of delivery. There was a significant difference in the distribution of decision makers reported by women who delivered at a health facility and those who did not. Sixty-eight percent of women who delivered at a health facility reported that the decision was made by their husband and 14% reported that it was made by themselves. In contrast, 49% of women who delivered at home reported that the decision was made by their husbands and 40% reported that it was made by themselves. The percent of women reporting in-laws as decision-makers was similar for those who delivered at a facility and those who did not (10% and 9% of women, respectively). People women reported as decision makers in both situations are illustrated in **Figure 5.4.**

Differentials in skilled birth attendance utilization

As shown in **Table 5.4,** bivariate analyses adjusted for the multistage survey design show that age at delivery, literacy, household wealth status, gravidity, and having at least one antenatal care visit with a skilled provider were all associated with use of skilled birth attendance. In addition, living in the catchment area of a facility that provided cash incentives to women delivering at the facility as well as to community health workers who referred them (1.5% of the study population living in proximity to 14 sub-centers in Badakshan province), and living in certain provinces were negatively associated with skilled birth attendance. At the provincial level, improvements in overall health system performance, measured both in terms of overall mean score measured and the percent of health system performance benchmarks met, appeared to be associated with increased odds of skilled birth attendance.

Factors associated with the utilization of skilled birth attendance

Results of multilevel random intercept logistic regression models are shown in **Table 5.5.** At the individual level, literate women, women in the upper two wealth quintiles, and women with at least one antenatal visit to a skilled provider were significantly more likely to deliver in the presence of a skilled attendant. Controlling for other individual and facility characteristics, women that had at least one antenatal visit with a skilled provider were 5.6 times more likely (95% CI: 4.4, 7.1; $p \leq 0.001$) to deliver with a skilled attendant than those who did not. The odds of skilled birth attendance were 84% (95% CI: 1.2, 2.7; p=0.003) higher for literate women and appeared to grow with increases in level of household wealth. The likelihood of skilled birth attendance was 79% higher (95% CI: 1.22, 2.63; p=0.003) among women from the richest 20% of households in the study area compared with the poorest.

The odds of skilled birth attendance also appeared to decline significantly with age, but not consistently. Women between the ages of 20 and 25 at the time of delivery were 29% less likely

to deliver with a skilled attendant than women between the ages of 15 and 19, women aged 25-29 were 11% less likely (0.63/0.71=0.89) to deliver with a skilled attendant than women aged 20-24, and women aged 30-34 were 24% less likely to deliver with a skilled attendant than women aged 25-29. Women aged 35-39 were 31% more likely (0.63/0.48=1.31) to deliver with a skilled attendant than women aged 30-34, but still significantly less likely to deliver with a skilled attendant than women aged 15-19.

Facility level factors, including province (collinear with measures for donor and health system performance) and whether a demand-side financing project was in place at the facility did not appear to have a significant association with skilled birth attendance in the fully adjusted model accounting for both individual/household and facility-level factors. The variance of the random intercept term showed a significant difference in outcomes across facility catchment areas, 13% of which is attributable to unobserved facility-level characteristics.

Discussion

This study suggests that individual and household factors have much greater influence on the individual likelihood of skilled birth attendance than facility characteristics in north-central Afghanistan, but also reveals information that may mask the contribution of health system factors when studies are based on intended facility catchment areas rather than actual utilization patterns.

Individual and household level determinants of skilled birth attendance

This study highlights the relationship between skilled antenatal care and skilled birth attendance, adding further support to global evidence that antenatal care is a strong predictor of professional care at birth, even if observed associations between utilization of both services are subject to confounding by other factors.[72,133-135] In Afghanistan, key components of antenatal care include communication of health-related information, screening for risk factors, the prevention and management of complications, and preparation for delivery in a safe place by skilled

attendants.[124] These services may increase the likelihood of skilled birth attendance by introducing women and their families to the formal health system and by increasing knowledge of danger signs of obstetric complications that can only be addressed with timely care seeking.[136,137] The increased odds of skilled birth attendance seen with literacy and higher wealth status are also consistent with national and global findings.[93,138] Education has been shown to have a consistently positive dose-response effect on maternal health service utilization, and similar associations with all types of health behavior.[72]

This study's findings differ from research in other settings where utilization of skilled birth attendants tends to be higher among older women than younger women. In these cases, age is often presented as a proxy for accumulated experience, including in the use of health services, and its effect is reduced when controlling for parity.[72] In the study population, age seemed to have the reverse effect. The lower odds of skilled birth attendance observed in women of older age groups may be a factor of historical norms and experience. Older women may have lived the majority of their child-bearing years with extremely limited or no access to health services and thus are less likely to utilize relatively recently established or revitalized and improved facilities than younger women.

Facility level determinants of skilled birth attendance

Although this study did not identify specific facility-level determinants of skilled birth attendance, the significant variance detected across catchment areas and proportion of individual likelihood of skilled birth attendance associated with unobserved facility-level characteristics is consistent with existing evidence. Multilevel analyses from other settings have similarly found significant variations in the use of maternal health services at the village and district level and highlighted the need to look beyond individual and household level factors when examining maternal health care seeking behavior.[117-119] Viswanathan's analysis of the 2006 Afghanistan

Health Survey that found that 30% of variation in individual likelihood of skilled birth attendance could be attributed to unobservable village characteristics after controlling for presence of a community health worker and distance to the closest health facility. Understanding the reasons for variation across communities is important for service planners and implementers. These differences may be due to social, political or environmental factors, or may be related to the level of services available and experiences during previous interactions with the health sector.[139-142]

The fact that nearly three-fifths of women who delivered with a skilled attendant bypassed the nearest primary health care facility to deliver elsewhere suggests that service availability and quality play a major role in decisions about place of delivery. This highlights the need for further research on maternal care-seeking patterns to inform health system strengthening and maternal health program efforts. According to national policies, maternity services should be available at all primary healthcare facilities and hospitals, 24 hours per day, seven days per week, but this is not always the case in practice.[143,144] Globally, perception of low quality has been reported as a major factor in non-utilization or bypassing of facilities.[139,145-147] Studies in sub-Saharan Africa have shown that perceptions of higher technical quality attract women to deliver at hospitals over primary health care facilities that typically lack resources to provide comprehensive emergency obstetric care.[148,149] The proportion of women in this study who bypassed a primary health care facility to delivery at a public hospital or private facility suggests that this is likely the case in Afghanistan as well. However, more information is needed about service quality at both primary health care facilities and hospitals, as well as how decisions related to care-seeking are made in order to understand patterns in skilled birth attendance utilization.

In addition, there is still a significant gap between the percent of women receiving skilled antenatal care in Afghanistan and the percent of women utilizing skilled birth attendants. This study found that 36% of women had at least one skilled antenatal care visit but did not utilize skilled birth attendants, which is consistent with the gap found in recent national studies. The

2010 Afghanistan Mortality Study found 60% of women received antenatal care from a skilled provider and only 33% of women delivered with a skilled attendant.[93] Similar gaps are seen in many low and middle income countries with limited access to health facilities, but most studies that highlight this focus recommendations on increasing uptake and quality of antenatal care as a means of increasing skilled birth attendance coverage, not on how to narrow the gap or scale up coverage of both services to reach women without any current contact with the health system.[150,151]

Addressing barriers to skilled birth attendance

Although all survey participants lived within two-hours walking distance of a public health facility, the travel time the MoPH uses to define access to primary health care services, the most common reasons provided for home delivery were distance and lack of transport, lack of affordable transport, and cost. This suggests that many of these women would seek skilled birth attendance if they perceived it to be accessible. It is possible that definitions of access used to monitor improvements in health service coverage of Afghanistan are too generously defined, and that a much smaller radius should be used in defining access to delivery services given the difficulty of travel for women in labor. However, because the 2010 Household Survey did not ask women where they would seek care if distance and cost were not prohibitive, there is no way to know if these are barriers to care seeking at the closest primary health care facility or elsewhere. It is possible that other factors deter women from delivering at primary healthcare facilities and these are barriers to accessing higher level facilities most commonly located in district or provincial capitals. Review of facility records to identify villages in each district that are represented in maternity case files could provide insight on how far women are traveling to seek care, and whether they are doing so for 'normal' deliveries or only in the event of complications. Using geographic information systems to map utilization patterns and catchment areas has also been informative for maternal health service planning in other settings and could be helpful in

deciding where to deploy newly trained midwives, upgrade facilities to provide emergency obstetric care, or establish additional maternity waiting homes for greatest impact.[152-154]

At the same time, one quarter of women who delivered at home, including a similar number of women who received antenatal care and those who did not, reported choosing not to deliver at a facility because they did not think it was necessary. Perceived benefits of skilled birth attendance are generally shaped by understanding of the complications that could occur during childbirth, risk assessment of the current pregnancy, past experiences with pregnancy, childbirth and health services, perceived quality of services available at health facilities and social norms.[155] Factors determining positive-deviant behaviors of women with at least one skilled antenatal care visit that elect to deliver with a skilled attendant could not be identified in this study but could greatly inform health promotion strategies.

It is also noteworthy that 13% of women who delivered at home reported choosing not to deliver at a facility because of unfriendly staff. The pervasiveness of disrespect and abuse in facility-based delivery care has recently been highlighted as an important barrier to care in many settings, and there is a growing evidence base suggesting that in some settings disrespect and abuse may act as a more powerful deterrent to skilled birth attendance than other more commonly recognized barriers such as geographic and financial obstacles.[156,157] Multiple factors may contribute to the 'unfriendliness' of staff or lack of respectful care at health facilities. Health systems may be underequipped, and healthcare workers may be overwhelmed due to inadequate pay, lack of infrastructure, or insufficient staff and supplies. An attitude of disrespect for clients and patients may also permeate the healthcare system, and healthcare workers may not receive any guidance or supportive supervision related to respectful care or their work in general.[147,156-158]

Given that most women reported that their husbands decided where they should deliver, one strategy for overcoming both access barriers and lack of perceived need for skilled birth

attendance is to engage respected leaders and local health activists in strengthening community-facility linkages and encouraging the involvement of husbands and families in birth preparedness efforts. Current literature shows that women whose husbands show concern in pregnancy are more likely to utilize maternal health services and that when men know danger signs of obstetric complications, they may act as life-saving agents, ensuring their wives get appropriate attention when complications arise. [159-163] Although patriarchal social norms in Afghanistan do not favor men's involvement in maternal health, studies in neighboring countries have shown that husbands are increasingly open to with issues related to maternal health which was traditionally considered "women's business" and the MoPH has expressed commitment to engaging men, families and communities in maternal health promotion activities.[164] Proposed strategies for translating this commitment into action include promoting the creation of family health action groups that provide a liaison between the community and health service providers and developing a curriculum to train religious leaders to support reproductive and maternal services in their communities.[165] Adapting these strategies based on an understanding of where women in each community deliver and why is critical to ensuring that women with obstetric complications have access to life-saving care when they need it.

Study strengths and limitations

This study has several limitations. First, the study was limited to nine provinces in north-central Afghanistan that do not reflect the diversity of geographic, security and socio-economic conditions across the country. Second, it was limited to women whose most recent delivery resulted in a live birth and did not collect information on whether a woman experienced any obstetric complications, which may have had a profound influence on care-seeking. Third, lack of information on primary healthcare facility and hospital staffing, hours of operation, and performance limited the ability to assess how supply side factors influence individual likelihood of skilled birth attendance. Finally, because this study used cross-sectional data, causality cannot

be inferred. Despite these limitations, this study revealed patterns in skilled birth attendance utilization that should be considered when evaluating the effectiveness of current program strategies and allocating resources to facilities.

Conclusion

This study builds upon earlier studies from Afghanistan as well as research from other settings by exploring the determinants of skilled birth attendance at the individual/household and facility levels. Findings illustrate the inequities in health service coverage based on wealth and education status, and highlight the importance of understanding patterns in care seeking for successful scale-up of safe delivery services. Findings also show a significant gap between the percentage of women receiving skilled antenatal care and the percentage of women who deliver with a skilled attendant, and reveal that the majority of women who do deliver with skilled attendants bypass the nearest primary healthcare facility to deliver at a hospital or private clinic.

Greater efforts are needed to understand the factors influencing care-seeking decisions in both emergency and non-emergency situations and to adapt both supply and demand side strategies to increase skilled birth attendance accordingly. Starting points for improvement may be introducing efforts to improve the quality of care at all facilities and mapping where women who seek care actually deliver so that efforts to strengthen community-facility linkages and engage household decision-makers in birth preparedness efforts are targeted to meet the needs and preferences of women in each community.

Table 5.1: Socio-demographic characteristics, health system performance and institutional delivery in study provinces, 2009/10

	Badakhshan	Balkh	Bamyan	Jawzjan	Panjsher	Parwan	Samagan	Sar-i-pul	Takhar	Study Province Median	National Median	National range
Provincial characteristics												
2009 Population (thousands)	8,603	12,000	4,047	4,8530	1,391	6,000	3,504	5,054	8,864	4,953	4,896	1,340-35,685
Area (km^2)	44,059	17,249	14,175	11,798	3,610	5,974	11,262	16,360	12,333	12,333	13,436	3,610 - 54,778
2009 Health facilities per 100,000 pop.	5.8	5.6	9.1	5.6	9.3	7.0	6.0	5.3	6.1	5.6	6.0	2.4 - 11.2
2009 Health facilities per 1,000 km^2	1	4	3	2	4	7	2	2	4	3	2	0.2 - 28.2
2007/08 Poverty rate (% pop.)[76]	61	60	56	15	23	19	55	25	37	25	38	12.2 - 75
2007/08 Literacy rate (% pop.)[166]	24	27	20	16	28	27	23	9	17	17	20	8.2 - 46.8
2007/08 Avg. distance to road (km)[166]	19	3	6	25	3	1	5	3	4	4	2	0.1 - 24.9
2009 Annual security incidents	46	135	13	61	1	68	16	52	103	61	167	1 - 1,388
Health system performance[21]												
Overall BSC mean score	57	70	67	72	62	73	70	65	72	70	71	57-82
Percent of upper benchmarks met	25	46	58	58	42	63	63	54	54	56	58	25-75
Overall patient satisfaction	68	84	71	81	75	87	78	75	76	77	76	67-88
Patient perception of quality	70	79	74	78	77	83	73	76	76	76	77	63-86
Village health council activity	51	91	95	90	63	100	93	88	96	92	83	39-100
Health worker satisfaction	68	66	69	68	72	80	65	70	75	69	68	57-80
Current salary payment	46	48	68	73	37	89	93	22	45	58	71	9-99
Infrastructure	44	64	54	66	60	59	61	35	76	61	64	35-86
Equipment functionality	77	81	91	93	86	92	91	82	86	88	87	72-98
Drug availability	49	80	86	89	73	77	84	95	95	85	90	49-98
Family planning	93	89	89	94	83	82	93	100	100	91	89	76-100
Laboratory functionality	24	57	80	73	57	37	53	69	60	59	63	24-83
Required staffing	86	95	81	90	80	95	81	78	95	86	90	69-100
Training	40	48	26	37	60	41	37	45	48	43	47	19-85
Provider knowledge	71	74	70	72	53	74	67	66	82	71	71	49-83
Clinical guidelines	61	81	88	90	72	91	89	79	82	85	80	56-96
HMIS use	52	76	92	79	63	91	95	87	67	83	77	52-97
Patient record index	63	63	62	66	58	67	66	66	63	64	63	42-82
TB register	50	55	50	82	36	57	36	36	57	52	51	23-100
Patient history and exams	71	80	76	77	72	89	75	73	80	77	74	67-90
Patient counseling	21	27	25	30	26	38	28	19	40	27	30	11-64
Proper sharps disposal	43	61	5	71	60	58	100	32	81	61	71	5-100

Table 5.2: Characteristics of public primary health care facilities in study sample, by type

	Sub-Center (n=42)	Basic Health Center (n=70)	Comprehensive Health Center (n=28)	Total (n=140)	p-value
Managing agency (%)					
International NGO	26	24.1	25	25	
National NGO	42	51.7	53.6	49.2	0.848
No NGO support	32	24.1	21.4	25.8	
Has demand-side financing program (%)					
No	86	100	100	95.7	**0.001**
Yes	14	0	0	4.3	
Contracting scheme for provincial health system (%)					
Contracting out - World Bank PPA	47.6	20	42.9	32.9	
Contracting out - USAID PPG	23.8	60	35.7	44.3	**0.003**
Contracting in - World Bank PPA SM	28.6	20	21.4	22.9	
Province (%)					
Badakhshan	7.1	21.4	17.9	16.4	
Balkh	4.8	21.4	3.6	12.9	
Bamyan	47.6	2.9	0	15.7	
Jawzjan	11.9	2.9	0	5	
Panjsher	14.3	0	0	4.3	**≤0.001**
Parwan	0	12.9	53.6	17.1	
Samangan	0	17.1	10.7	10.7	
Sar-i-pul	14.3	1.4	0	5	
Takhar	0	20	14.3	12.9	

Table 5.3: Characteristics of women included in study sample, weighted by women's probability of selection (n=3,321)

	Number of women	%	95% CI
Age at delivery			
15-19	199	6	(5.2, 6.9)
20-24	833	25.3	(23.8, 26.9)
25-29	906	26.9	(26.9, 25.2)
30-34	657	19.7	(18.2, 21.4)
35-39	452	13.7	(13.4, 15.2)
40-44	199	6.1	(5.2, 7.1)
45-49	75	2.3	(1.8, 2.8)
Education			
No education	3,115	93.9	(92.7, 94.9)
Primary	120	3.4	(2.7, 4.3)
Secondary or higher	86	2.7	(2.1, 3.5)
Literacy			
No	3,161	95.4	(94.4, 96.2)
Yes	159	4.6	(3.7, 5.5)
Wealth quintile			
Lowest	582	17.5	(14.5, 20.9)
Second	636	19.4	(16.9, 22.2)
Middle	707	20.7	(18.5, 23.0)
Fourth	657	20.6	(17.9, 23.5)
Highest	739	21.8	(18.4, 25.7)
Gravidity			
No previous deliveries	207	6.9	(4.9, 9.5)
One or more deliveries	3,114	93.1	(90.5, 95.1)
History of stillbirth or spontaneous abortion			
No	1,771	60.6	(58.1, 63.2)
Yes	1,141	39.3	(36.8, 41.9)
Had at least one ANC visit with skilled provider (includes CHW)			
No	1,277	41.6	(37.5, 45.8)
Yes	1,701	58.4	(54.2, 62.5)
Skilled attendance at delivery			
No	2,484	74.6	(71.6, 77.3)
Yes	837	25.4	(22.7, 28.3)
Closest MoPH facility type			
Sub-Center	986	13.5	(11.9, 15.3)
Basic Health Center	1,643	59.2	(56.1, 62.3)
Comprehensive Health Center	692	27.3	(24.6, 30.1)
Agency managing closest MoPH facility			
International NGO	838	29.1	(22.5, 36.7)
National NGO	1,459	50.5	(42.6, 58.4)
No NGO support	764	20.4	(14.9, 27.3)
Closest MoPH facility has demand-side financing program			
No	3,180	98.5	(97.1, 99.2)
Yes	141	1.5	(0.8, 3.0)
Contracting scheme for provincial health system			
Contracting out - World Bank PPA	1,076	32.4	(25.8, 39.8)
Contracting out - USAID PPG	1,481	48.7	(41.1, 56.30
Contracting in - World Bank PPA SM	764	18.9	(13.7, 25.4)
Province			
Badakhshan	251	7.5	(4.5, 12.1)
Balkh	517	12.8	(8.8, 18.3)
Bamyan	479	14.9	(10.1, 21.5)
Jawzjan	190	8.6	(4.9, 14.7)
Panjsher	178	3.8	(1.9, 7.4)
Parwan	639	15.7	(11.0, 21.8)
Samangan	344	12.4	(8.0, 18.7)
Sar-i-pul	162	6.7	(3.6, 12.1)
Takhar	561	17.7	(12.1, 25.2)

Table 5.4: Bivariate analysis of study sample characteristics and skilled birth attendance

	Odds ratio	95% CI	p-value*
Age at delivery (Ref: 15-19)			
20-24	0.6	(0.43, 0.86)	**0.005**
25-29	0.5	(0.37, 0.79)	**0.001**
30-34	0.5	(0.31, 0.67)	**≤0.001**
35-39	0.6	(0.40, 0.93)	**0.021**
40-44	0.5	(0.27, 0.77)	**0.003**
45-49	0.3	(0.14, 0.62)	**0.001**
Education (Ref: no education)			
Primary	2.5	(1.59, 3.85)	**≤0.001**
Secondary or higher	3.1	(1.88, 5.06)	**≤0.001**
Literacy (ref: cannot read)			
Can read	2.8	(1.99, 3.97)	**≤0.001**
Wealth quintile (Ref: lowest)			
Second	1.3	(0.88, 1.76)	0.205
Middle	1.4	(0.94, 1.98)	0.106
Fourth	2.3	(1.59, 3.42)	**≤0.001**
Highest	3.4	(2.32, 4.93)	**≤0.001**
Gravidity (Ref: no previous pregnancies)			
One or more previous pregnancies	2.19	(1.46, 3.29)	**≤0.001**
History of spontaneous abortion or stillbirth (ref: no previous losses)			
Spontaneous abortion or stillbirth in one or more pregnancies	0.98	(0.81, 1.18)	0.839
Had at least one ANC visit with skilled provider (Ref: no visits)			
Yes	6.38	(4.88, 8.35)	**≤0.001**
Closest MoPH facility type (Ref: Sub-Center)			
Basic Health Center	1.2	(0.84, 1.75)	0.303
Comprehensive Health Center	1.2	(0.82, 1.78)	0.337
Agency managing closest MoPH facility (Ref: international NGO)			
National NGO	0.8	(0.59, 1.20)	0.335
No NGO support	1	(0.65, 1.52)	0.654
Closest MoPH facility has demand-side financing program (Ref: no project)			
Yes	0.21	(0.08, 0.54)	**0.002**
Contracting scheme for provincial health system (ref: Contracting out - WB)			
Contracting out - USAID PPG	0.92	(0.65, 1.29)	0.614
Contracting in - World Bank PPA SM	1.2	(0.73, 1.66)	0.639
Overall health system performance mean score	1.03	(1.00, 1.06)	**0.036**
Percent of health system performance benchmarks met	1.01	(1.00, 1.02)	**0.053**
Province (ref: Parwan)			
Badakhshan	0.32	(0.17, 0.62)	**0.001**
Balkh	0.82	(0.46, 1.47)	0.512
Bamyan	0.87	(0.59, 1.43)	0.581
Jawzjan	1.87	(1.04, 3.37)	**0.036**
Panjsher	0.71	(0.32, 1.55)	0.387
Samangan	1.05	(0.65, 1.71)	0.831
Sar-i-pul	0.43	(0.25, 0.74)	**0.003**
Takhar	0.51	(0.30, 0.86)	**0.012**

Table 5.5: Results of multilevel logistic regression predicting individual likelihood of skilled birth attendance for most recent delivery within the last two years

	Null, b (SE)	Individual factors, OR (95% CI)	Facility factors, OR (95% CI)	Full model, OR (95% CI)
Fixed effects: Individual level variables				
Age at delivery (ref: 15-19)				
20-24	-	0.69 (0.46, 1.04)*	-	0.71 (0.47,1.07)*
25-29	-	0.62 (0.41, 0.93)**	-	0.63 (0.42, 0.95)**
30-34	-	0.47 (0.30, 0.72)***	-	0.48 (0.31, 0.74)***
35-39	-	0.61 (0.39, 0.96)**	-	0.63 (0.40, 0.98)**
40-44	-	0.53 (0.31, 0.93)**	-	0.54 (0.31, 0.94)**
45-49	-	0.50 (0.23, 1.10)*	-	0.52 (0.24, 1.13)*
Literate (ref: cannot read)				
Literate	-	1.84 (1.23, 2.76)**	-	1.84 (1.22, 2.75)**
Wealth quintile (ref: lowest)				
Second	-	1.04 (0.73, 1.49)	-	1.04 (0.72, 1.49)
Third	-	1.21 (0.85, 1.72)	-	1.22 (0.85, 1.74)
Fourth	-	1.53 (1.06, 2.19)**	-	1.53 (1.06, 2.22)**
Highest	-	1.76 (1.22, 2.53)**	-	1.79 (1.22, 2.63)**
Gravidity (Ref: none)				
One or more	-	1.51 (0.91, 2.51)	-	1.27 (0.74, 2.18)
Skilled ANC (Ref: none)				
At least one	-	5.78 (4.54, 7.37)***	-	5.60 (4.38, 7.14)***
Fixed effects: Facility level variables				
Demand-side financing (Ref: no project)				
Yes	-	-	0.32 (0.11, 0.93)**	0.35 (0.12, 1.06)*
Province (ref: Parwan)				
Badakhshan	-	-	0.24 (0.12, 0.52)***	0.55 (0.25, 1.20)
Balkh	-	-	0.63 (0.36, 1.06)*	0.81 (0.45, 1.43)
Bamyan	-	-	0.72 (0.41, 1.24)	1.55 (0.85, 2.83)
Jawzjan	-	-	1.63 (0.78, 3.39)	0.73 (0.43, 1.23)
Panjsher	-	-	0.36 (0.16, 0.81)**	1.26 (0.63, 2.51)
Samangan	-	-	0.94 (0.51, 1.72)	1.28 (0.74, 2.22)
Sar-i-pul	-	-	0.34 (0.15, 0.76)**	0.76 (0.34, 1.69)
Takhar	-	-	0.44 (0.24, 0.76)**	0.51 (0.24, 1.11)
Random effects				
Facility-level variance (SE)	0.94 (0.17)	0.62 (0.13)	0.65 (0.12)	0.50 (0.11)
Facility-level VPC (%)	22%	16%	16%	13%
Level 1 units	3,321	2,978	3,321	2,978
Level 2 units	140	140	140	140
Log likelihood	-1,745.22	-1,424.68	-1,724.83	-1,414.09
Model fit				
df	2	15	11	24
AIC	3,494.44	2,879.37	3,471.65	2,876.18
BIC	3,506.66	2,969.35	3,538.84	3,020.16

Two-level random intercept logistic regression model testing using Stata command xtmelogit with 10 integration points; Level of significance: ***P<0.001; ** P<0.05, *P<0.10

Figure 5.1: Map of provinces covered by 2010 Household Survey

Figure 5.2: Place of delivery for women utilizing skilled birth attendants, by closest BPHS facility type (n=837)

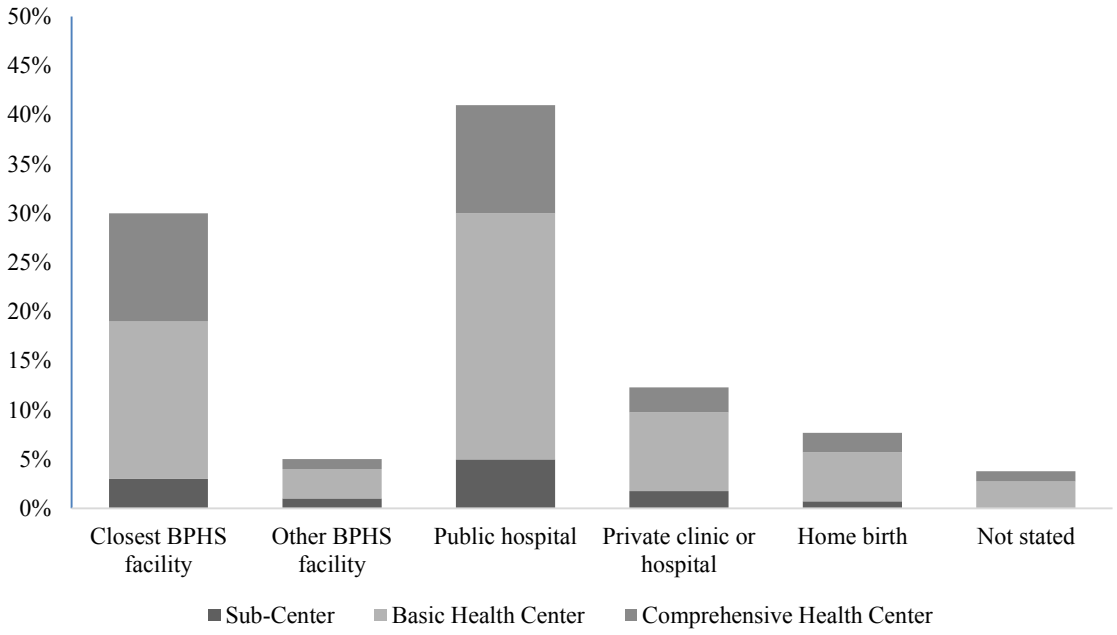


Figure 5.3: Reasons women reported for not delivering at a health facility (n=2,058)

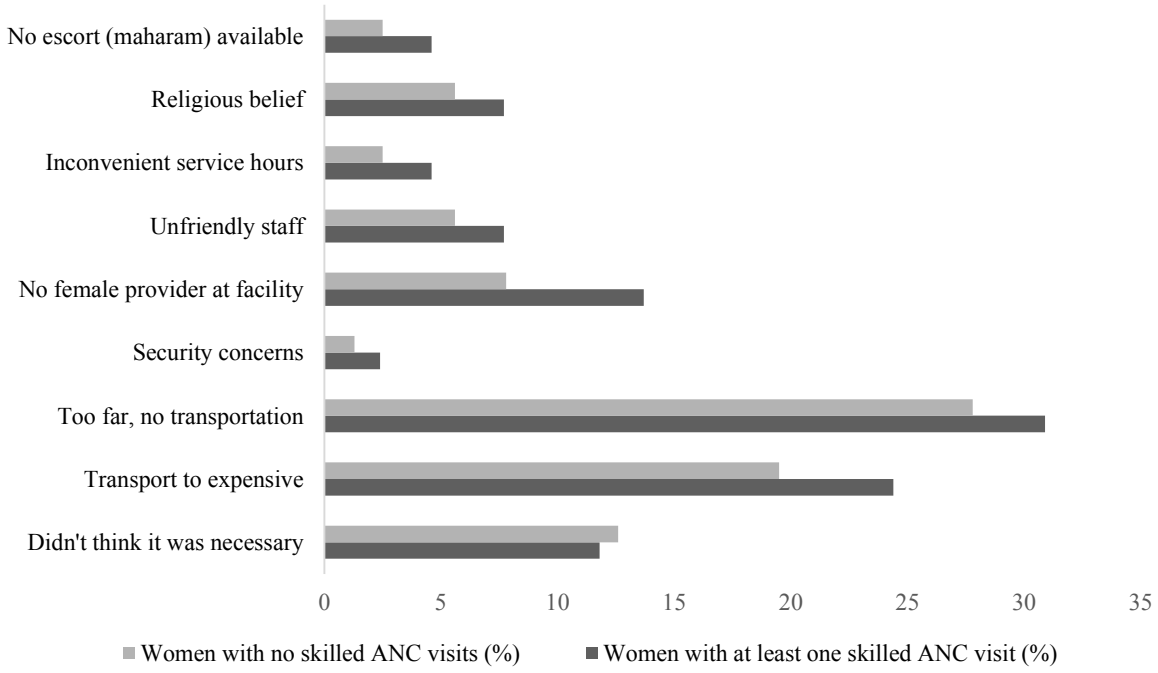
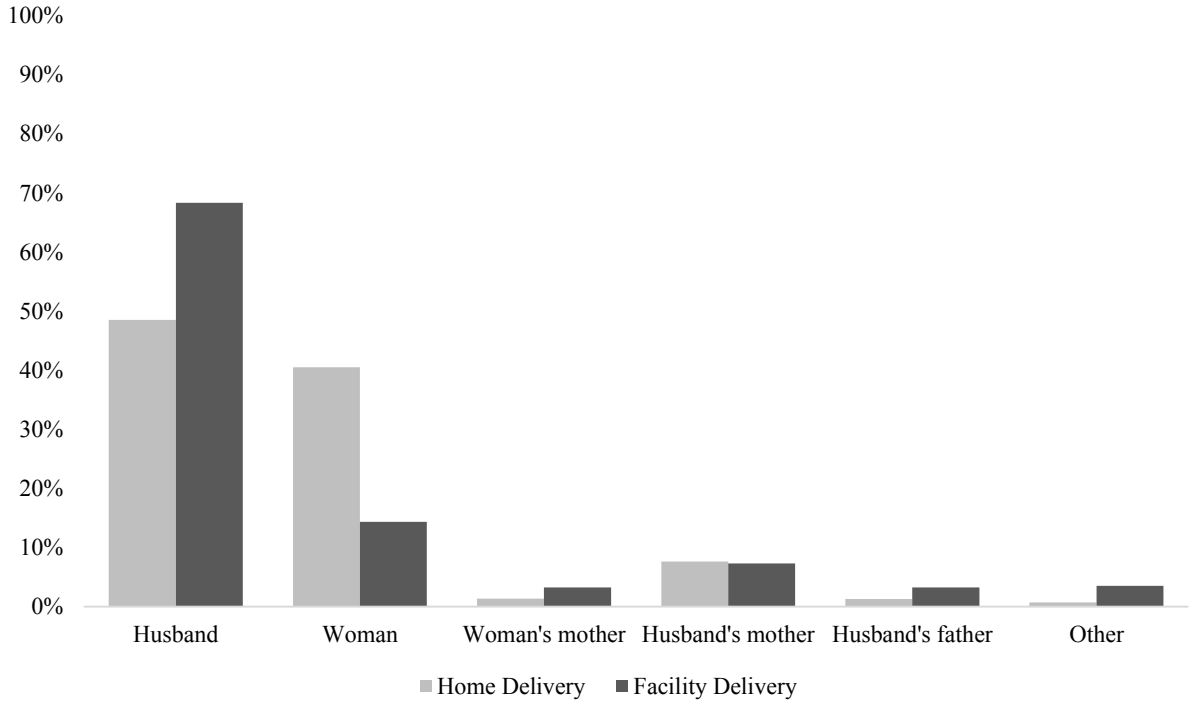


Figure 5.4: Person reported as decision-maker about place of delivery (n=3,077)



Chapter 6 Context matters in essential maternal health service planning: challenges of intrapartum care scale-up in four districts of Afghanistan (Paper 3)

Abstract

Recent studies suggest that, despite ongoing conflict and instability, investment in socio-economic development in Afghanistan has contributed to dramatic reductions in maternal mortality over the last decade. Critics argue that while there have been some improvements, the achievements claimed are "too good to be true" and substantial barriers remain. This study is designed to assess achievements and gaps in the availability, utilization and quality of essential maternal health services in four districts of Afghanistan where mortality studies were conducted in 2002 and 2010. Information on the most significant changes in each district were collected through interviews with community members, healthcare providers, and district, provincial and national officials. This information was then triangulated with documentation of policy and program implementation in each district to identify factors that affect the coverage of safe delivery and emergency obstetric care services. When asked about barriers to utilization of these services, three common themes were highlighted by national policymakers, provincial and district-level healthcare providers, and community members: (1) structural barriers such as lack of infrastructure or human resource shortages limiting availability of services, (2) programmatic barriers such as limited technical capacity hindering provision of quality care, and (3) contextual barriers affecting when, where and why women deliver at facilities. Comparison of barriers to maternal health service coverage across the four districts highlights the complexities of health policy planning and resource allocation in Afghanistan, and suggests that current health service delivery models may not be an effective approach for scaling up intrapartum care services in extremely remote or insecure settings. Improvements in service coverage must be measured at a sub-national level, and health policies for conflict-affected settings adapted to consider the health needs and preferences of women in hard-to-reach areas.

Introduction and background

In 2010, there were an estimated 342,900 maternal deaths globally, a decline from 409,100 in 1990.[1] It is often claimed that "we know what works" to improve maternal health, but that the real challenge in reducing maternal mortality is "getting what works to happen" in low-income countries where 99% of maternal deaths occur.[3,6,167] Getting the appropriate mix of skilled health workers and supplies where they are needed most is no easy task, especially in settings where demand for maternity services is low and there is competition for allocation of limited resources.[8] The systemic and operational challenges of scaling up interventions to ensure that all women have access to quality intrapartum care are even greater in conflict-affected countries where damaged health infrastructure, health workforce depletion, and limited government capacity for domestic resource mobilization, service provision and stewardship are the norm.[9,36]

To increase the coverage of lifesaving maternal health services, barriers to both the supply and demand of health care service provision must be addressed. On the supply side, the scale-up of service availability is dependent on the existence of a skilled workforce, the availability of equipment and supplies, and the management of systems to allocate resources, track their use, and monitor need.[64,65] On the demand side, physical and geographical barriers to service utilization are further complicated by socio-cultural factors at the individual, household and community level that may influence where, when and how women seek care for obstetric complications when they occur.[66]

An increasingly common first step in restoring health systems in countries emerging from civil conflict is to rapidly scale-up a set of cost-effective primary care services to address the country's priority health problems.[88,89] In brief, the Basic Package of Health Services (BPHS) in these countries has consisted of a limited set of cost-effective priority health services addressing the country's major health problems, with non-governmental organizations commonly contracted to deliver the agreed package of services, while the government and international donors take

responsibility for stewardship and oversight of implementation.[85-87] Potential advantages of the national roll-out of a BPHS include rapid increases in healthcare coverage, coordination, and standardization of services, facilities, staffing, drugs and equipment across the health system. There has been little research to date, however, on the pros and cons of this approach in specific technical areas, or examination of the effect on equity and quality of services in the long term.

In Afghanistan, the establishment and stewardship of a BPHS for primary health care facilities and an Essential Package of Hospital Services (EPHS) for district, provincial, regional and national hospitals, have provided a foundation for dramatic improvements in health system coverage and standardization of care since 2003. When the Taliban were removed from power in Afghanistan in late 2001, the country had very little public health infrastructure and some of the worst health indicators in the world, including an infant mortality rate of 165 per 1,000 live births, under five mortality rate of 257 per 1,000 live births and maternal mortality ratio of 1,600 maternal deaths for every 100,000 live births.[168] Health facilities were situated primarily in accessible urban or more secure rural areas, leaving nearly 60% of the population without access to any form of health services.[13]

In order to address gaps in the health workforce required to implement the BPHS across the country, the Ministry of Public Health and its international donors introduced in-service clinical refresher training programs for physicians and two pre-service education programs to train and deploy midwives. One program was designed to establish community midwifery education schools to train providers for BPHS facilities, and the other to strengthen existing programs that train midwives for placement in hospitals.[144] Government reports show that the number of trained midwives in the country increased from 467 in 2003 to approximately 2,200 midwives in 2010,[90] and population-based studies have shown improvements in skilled birth attendance estimates from less than 10% in 2003 (6% rural, 35% urban)[91] to 19% in 2006 (rural areas only)[92] and 34% in 2010 (26% rural, 71% urban).[93] While these would be notable achievements in any setting,

they are particularly impressive when the ongoing conflict and poor security situation in Afghanistan are taken into account. At the same time, it is important to remember that skilled birth attendance only contributes to reduction in maternal mortality if the trained provider is able to detect complications and either provide lifesaving treatment or facilitate safe, timely referral to a capable facility and provider; a 2010 facility assessment found that only 56% of the hospitals intended to provide comprehensive emergency obstetric care in Afghanistan are actually able to provide these services.[26]

This aim of this study is to explore the conditions that affect the availability and utilization of intrapartum care services in four districts of Afghanistan. A number of primary and secondary data sources are used to examine the structural, programmatic and contextual factors that affect the reach of health services to women who experience complications during labor and delivery. By investigating the way in which essential maternal health services are provided and used at the community, district, province and national levels, this study can help policy-makers understand where the BPHS service model is and is not effective in addressing maternal health needs. It can also contribute to the growing evidence base and study of maternal health inequities in low-resource settings.

Methods

Study setting

The sites selected for this study are the four districts, each from a different province, that were purposively selected for a two-stage retrospective cohort study of reproductive age women conducted by the US Centers for Disease Control and United Nations Children's Fund in 2002 – RAMOS I,[169] and revisited in a follow-up study conducted by Johns Hopkins School of Public Health in 2011 to measure changes in risk of maternal death over the last decade – RAMOS II.[170]

The four districts were purposively selected by the US Centers for Disease Control and United Nations Children's Fund after classification of all provinces by remoteness (measured by population, access to urban resources, and distance to the nearest health-care facility with basic and comprehensive emergency obstetric care). After accounting for accessibility, security, weather and geographical constraints, one district in each province was identified that could be considered representative of the degree of remoteness consistent with the rest of the province.[169] The selected districts, illustrated in **Figure 6.1**, were Kabul City, Kabul Province (urban); Alisheng District, Laghman Province (semi-rural); Maiwand District, Kandahar Province (rural); and Ragh District, Badakshan Province (rural, mostly remote). In time since the 2002 study, Ragh district has been subdivided into three districts – Raghistan, Kohistan and Yawan – which together have the same borders as the original Ragh district and will be referred to collectively as Ragh district for the purposes of this study.

Data sources

Various methods were used for collecting information about intrapartum care availability, utilization and quality, including a review of literature (i.e. published and unpublished reports of government and non-government agencies), secondary analysis of data from the government's Health Management Information System (HMIS) at the province and district level, in-depth interviews and focus group discussions. Individual interviews were conducted with four levels of respondents (community members, district level health officials and service providers, province level health officials and service providers, and national health policy makers), and focus group discussions conducted with separate groups of men and women of reproductive age in each district.

Data collection

Qualitative data collectors were men and women who spoke either Dari or Pashto and English. Data collectors were divided into two teams, one Dari and one Pashto, which consisted of two note-takers, one male and one female, and two interviewers, one male and one female. In addition, each team also had a supervisor who obtained community consent, identified participants in consultation with the community, and performed quality checks on interviews and discussions. To ensure consistent interpretation of study tools across languages and interviewers, all team members were trained using interview and focus group discussion guides tailored to each level of respondent. The rationale for each question was reviewed in training, as well as rapport building, probing techniques, observation and note-taking skills.

At the national level, five key informants with national-level responsibility for reproductive health service implementation were identified in consultation with the RAMOS II Steering Committee (consisting of interested Ministry of Public Health officials and international development agency representatives) and invited for in-depth interviews. In each of the four provinces, four to six government officials and healthcare providers were selected for in-depth interviews, depending on the Ministry of Public Health and health facility staffing structures for that province. In addition, men and women in three communities per district were invited to participate in focus group discussions, for a total of six per district; communities were selected in consultation with health sector stakeholders to represent a range of village size and accessibility. In-depth interviews and focus group discussion conducted in each study district are presented in **Table 6.1.**

Each interview was conducted by two persons, one facilitating and the other taking notes. At the community level, all male interviews and focus groups were conducted by men and all female interviews and focus groups were conducted by women. Interviews lasted approximately 30 minutes and focus groups approximately 45 minutes, depending on the time the participants had

available and their ability to offer answers. Verbal informed consent was obtained from each participant prior to initiation of the interview and focus group discussion. Whenever possible, interviews and focus groups were recorded. However, concerns about privacy prevented several female focus groups and discussions from being recorded, and in these cases, detailed notes were taken. After each interview was conducted, the interviewer and note-taker compared notes and debriefed with the supervisor. Debriefing included any challenges faced, as well as data collection team members perceptions of power relations within interviews and focus group discussions, as well as how study participants' and researchers' age, ethnicity, occupation and other factors such as the location and timing of interviews may have affected participants' responses. The supervisor then reviewed the team's notes and when possible, reviewed the digital recording to expand notes and identify strengths and weaknesses of each interview.

Translation and transcription

Translation and transcription were conducted by data collection team members and reviewed by senior RAMOS II study staff. Because male study team members had stronger English skills, they conducted the majority of transcription and translation work. However, in some male team members' knowledge of English vocabulary related to experiences of labor and delivery was limited. To address this limitation, a senior Afghan project staff with midwifery training and fluent English skills provided ad hoc translation assistance and reviewed recordings and translated text of all interviews with government officials, health services providers, and women who discussed experiences of childbirth with obstetric complications.

Data analysis

In-depth analysis was conducted using a primarily deductive Framework Analysis approach. Framework Analysis is a technique that was developed during the 1980s by the United Kingdom-based National Centre for Social Research, specifically for programmatic or policy-focused

studies.[80] One important feature of the approach is that, unlike some other more inductive analysis approaches, it allows themes or concepts identified *a priori* to be specified as coding categories from the outset, and to be combined with other concepts or issues that emerge during the analysis process. A practical benefit of this approach is that it allows explanations generated by previous studies and issues identified in advance by program stakeholders to be explicitly and systematically considered in the analysis, but also leaves enough flexibility to identify and incorporate issues that only become apparent during the analysis process.[80,81]

The first step of Framework Analysis is familiarization. This was done through a broad-stroke review of all transcripts and listing of key elements or themes covered in the interviews. The second step of Framework Analysis is to refine a conceptual model for analysis. Themes corresponding to content at each level of the conceptual framework for this study were identified, and sub-codes for each theme were constructed. Additional codes were added in recognition of the fact that factors affecting availability, utilization and quality of intrapartum care may differ for women who experience obstetric complications and those who do not. Two coders validated this list on four selected interview guides and inter-rater reliability was assessed. ATLAS.ti software was then used to annotate all transcripts using thematic codes and sub-codes, and to organize annotated text into charts to elucidate key factors facilitating or hindering maternal health service provision and utilization in each district.[79] The final steps of Framework Analysis, mapping and interpretation, were done in discussion with senior Afghan project staff involved in the interviews of national and provincial level health officials and in the review of transcripts from community level interviews and focus group discussions. Critical themes that emerged were triangulated with documentation of policy and program implementation in each district, and preliminary findings were shared with key members of the RAMOS steering committee to verify interpretation of results and relevance for health sector stakeholders in Afghanistan.

Ethical considerations

This study was approved by the Institutional Review Board of Johns Hopkins Bloomberg School of Public Health (IRB #3139) and the Afghanistan Public Health Institute of the MoPH.

Results

At the national level, substantial progress has been made in scaling up skilled birth attendance and access to emergency obstetric care. National stakeholders described significant changes over the last decade, but also highlighted continuing challenges and widening disparities in terms of access and quality of care across the country. These sentiments were echoed at the provincial, district and village level. Nearly all study participants provided examples of improvements in access and quality of care, but the extent of improvements and nature of barriers varied substantially from one district to the next. Access to a facility, the level of care available there, community mobility and household norms were common factors in whether women planned to deliver at a facility or only decided to seek care upon detection of complications. When asked about barriers to maternal mortality reduction, three common themes highlighted by national policymakers, healthcare providers and community members were: (1) structural barriers such as lack of infrastructure or human resource shortages limiting availability of services, (2) programmatic barriers such as limited technical capacity hindering provision of quality care, and (3) contextual barriers affecting when, where, and why women deliver at facilities. Specific factors affecting provision and utilization of intrapartum care in the four study districts are described in detail below.

Structural factors

Infrastructure

At the national and provincial level, Ministry of Public Health officials and healthcare providers all reported improvements in the availability and accessibility of health facilities since 2002. The scale of improvement, however, varied substantially across and within provinces and many health officials did note that there are still areas of the country where access is limited, particularly in remote and insecure regions. The number, as well as population and geographic density, of facilities in each district is presented in **Table 6.2** to illustrate differences in maternal health service availability**.**

In Kabul, Laghman and Badakshan study sites, both community members and health care providers reported substantive improvements in the number of functional health facilities in the district, as well as improvements in road networks and transportation availability. In Badakshan, however, many study participants reported that despite these improvements, access to health facilities remains extremely limited for much of the population. Despite having the highest facility density per population (1 facility per 21,850 population), Ragh, the most remote and mountainous of the four study districts has only one facility per 580 km^2. Routine health facility reports indicate less than 10% of births in Ragh occurred in public health facilities compared with more than 60% of births during the same time period in Kabul City. Alisheng district, which has a similar facility density per population but less mountainous terrain than Ragh, reported approximately 22% of births occurred in health facilities, more than double that of Ragh district and one-third as many as Kabul.

In Maiwand, the most insecure of the study districts with only one functional health facility, community members described improvements in road networks but less mobility and access to

health services than in 2002. In fact, as Table 2 shows, HMIS reports, which appeared to be complete, did not list any deliveries at the district's health center in 2010.

Human Resources

Human resource constraints were mentioned as a barrier to maternal mortality reduction in all districts. While training and deployment of community midwives was highlighted by both local community members and national policymakers as one of the greatest contributors to reduction in maternal mortality since 2002, study participants at all levels also highlighted the need for more trained providers, including both midwives and female doctors, to meet the needs of the population. As one health official explained,

> *Those who have access to clinics that have community midwives receive good care…If midwives are nearby, they can even go to help women deliver in their own homes. The problem is that not all women have access to facilities or midwives.*
>
> – Provincial health official, Badakshan

A national policymaker expressed similar consequences of a shortage of female doctors,

> *There are still provinces with no female doctor. How can you have women's reproductive health services without a doctor? In Daykundi* [a central province]*, we have no female doctor. In Nimroz* [a southwestern province]*, we have no female doctor. In Kabul and other provinces where access is better, we have made good progress, but still, not every district has a female doctor. In those places, women must travel far for emergency care or stay at home.*
>
> – National health official, Kabul

The implication of these shortages is evident in the number and gender of health workers across the four study districts. As shown in **Table 6.2**, the number of midwives per population in study districts ranged from 1 per 40,700 population in Maiwand district (Kandahar) to 1 per 4,858 population in Kabul City. The number of midwives per population in Kabul was 12 times greater than in Maiwand district, 3 times greater than in Alisheng district (Laghman) and 2.5 times greater than in Ragh district (Badakshan). Neither Maiwand district nor Alisheng district had a single female doctor.

Programmatic factors

Technical capacity

According to national guidelines, Comprehensive Health Centers are expected to provide basic emergency obstetric care (BEmOC), defined by seven basic life-saving procedures: administration of parenteral antibiotics, administration of parenteral anticonvulsants, administration of parenteral oxytocics, manual removal of the placenta, removal of retained products, assisted or instrumental vaginal delivery and newborn resuscitation. District, Provincial, Regional and Specialty Hospitals are all expected to provide comprehensive emergency obstetric care (CEmOC), defined by the provision of cesarean surgery and blood transfusion services, as well as the seven BEmOC functions. Routine health facility data and research studies show substantial limitations in the availability of CEmOC outside of Kabul and the 10 Provincial and Regional Hospitals across the country.

As **Table 6.2** shows, only two of the four study districts, the most urban and the most remote, have the infrastructure and human resource capacity to provide CEmOC services. In Kabul City, there are at least seven public facilities designed to have CEmOC capability, including four high-volume Specialty Hospitals. In Ragh District, although there is one facility equipped to provide CEmOC, interviews with health officials suggest that a large portion of the women seen at the facility with complications are still referred out to the Provincial Hospital for further care. Government monitoring reports confirm this: of the 17 cases with direct obstetric complications recorded at Ragh health centers in 2010, 10 were referred out to other facilities for further care (**Table 6.2**).

A national health official explained that it is not uncommon for health workers in rural areas to refer women with obstetric complications to higher level facilities; reasons from this range from

lack of knowledge or confidence in performing procedures to lack of resources or lack of authority to act without supervision.

> *All midwives should have skills to administer magnesium sulfate but they do not. In some cases of severe pre-eclampsia, they refer because they do not know how to perform the procedure. In some places, they have the knowledge to provide magnesium sulfate but it is not on the list of drugs that can be administered by midwives; it requires a doctor to prescribe. In some places midwives do not use MVA* [manual vacuum aspiration] *because the equipment is not available and in some cases they have the equipment but do not know how to perform the procedure so they refer.*
>
> – National health official, Kabul

If women experience obstetric complications that cannot be addressed at the district level, they must travel between 21km (Alisheng district, Laghman) to 120 km (Ragh district, Badakshan) to reach the closest referral facility in the provincial capital. The distance from study districts in Kandahar and Badakshan to the closest CEmOC referral facility suggests that even for the small proportion of women that do deliver with a skilled attendant, or seek care at the onset of obstetric complications, opportunities for timely access to lifesaving services may be limited.

Referral systems

Descriptions of cases seen by healthcare providers and experiences of community members participating in the study suggest that none of the study districts have a well-functioning referral network. Residents of semi-urban Alisheng, the district with the shortest distance to an EmOC referral facility outside of Kabul, described substantial improvements in maternal health service availability in their district as there is now a Comprehensive Health Center open 24-hours/day in the district center, a recently rehabilitated maternity ward, and an increasing number of private clinics in the provincial capital which is a 45-minute drive away. These facilities, however, have few female providers and focus groups conducted towards the outskirts of the district reported many women dying because of lack of access to health services. In all three areas of Alisheng district visited, most women preferred to deliver at home but consistently described that care

would be sought at facilities in the event of complications or if advised to do so by a doctor. Women described first going to the local clinic, then provincial hospital where they were then referred on to the regional hospital in Nangarhar, and in some cases then onto Peshawar in Pakistan. While the health center-in-charge and District Health Officer mentioned transferring women from the Alisheng health center to the provincial hospital via ambulance, community members mentioned using their own car (or privately arranged transport) from one facility to the next, and provincial hospital staff confirmed that most women from Alisheng come directly to the provincial hospital without being referred by the health center (in part because some villages are closer to the provincial capital than the district center where the health center is located).

In Badakshan, a midwife based at one of the more remote health centers explained,

> *When there is a woman with obstetric complications, I call the office in Faizabad* [the provincial capital] *to inform them that we have such a patient. If possible, we ask for an ambulance from Yawan to take the women to Faizabad hospital, but if not we give this responsibility to her family and the health shura* [village health council] *to make arrangements. Most families do not understand why the patient cannot be treated here but the health shura helps us to explain so that the families accept this and take the patient to the hospital, even carrying her until they can reach a passable road with transport.*
>
> – Midwife, Badakshan

No community members in Kabul mentioned referral from one facility to another, although many described bypassing the nearest public health facility to deliver at a specialized or private hospital.

Quality of care

Ministry of Public Health officials, staff at district and specialty hospitals, and community members all highlighted notable improvements in maternal health service quality since 2002. However, the way in which people were treated by facility staff was an important component of satisfaction with care in high-access Kabul city. Recently delivered women described long

waiting times at government hospitals, poor facility conditions such as open or broken windows in the maternity ward and poor treatment by staff such as neglecting patients until they "screamed for help" or refusing to let women leave the facility with their infants after delivery until "gifts" had been paid to the doctor, suggesting that while resources may be in place, the quality of care at high-volume specialty hospitals and under-resourced district facilities in the capital city may vary substantially. Consequently, community members in the three Kabul neighborhoods visited expressed preference for women to deliver at private or specialty hospitals because the availability and quality of care at these facilities is perceived to be higher. These tertiary care facilities intended to be teaching facilities and referral points for complicated cases, are therefore crowded with a high caseload of normal deliveries.

In Badakshan and Laghman, community members' perceptions of the quality of care at health facilities were generally positive. In Kandahar, opinions expressed were more mixed. Some community members spoke positively about the quality of care of midwives, with men mentioning that having midwives in the clinics "has solved many problems of the people in the village" and others explaining that "the women that call themselves midwives at private clinics do not have sufficient skills and experience …they cannot perform good practice".

Contextual factors

Gender, household decision-making and care-seeking

At all levels, there was widespread recognition of greater female mobility and maternal health care seeking compared to ten years ago, but also suggestions that women may still have limited decision-making authority or women's health may not be recognized as a priority concern within the home. Community members in all study areas nearly universally identified male household members and mother-in-laws as decision-makers.

Although most women in Ragh district (Badakshan) deliver at home with family members or traditional birth attendants, community members expressed a range of opinions about the importance and acceptance of institutional delivery:

> *Ten years ago it was not imaginable even, for people to think about taking their women to clinic. People were laughing at pregnant women who was expressing their pain or going to clinic. Pregnant women couldn't express their pain. They did not inform anybody when they went into labor, not even their family members. Going to clinic was shameful, so they had no option other than to keep silent. There were women who remained in labor for three days, and tolerated the pain without saying anything to anybody until their delivery. Now, times are better. People have become open minded, and with the first pains of labor they run for the clinic.*
>
> - Female FGD participant, Badakshan

> *The people still think taking their wife to clinic is a dishonorable act. It is shameful. If they don't have to they will not go to clinic, in condition of death risk, they will carry her to clinic on a ladder.*
>
> – Village elder, Badakshan

Similarly, while most women in Maiwand district (Kandahar) deliver at home and seek care only after complications are detected, study participants provided a range of reasons for home delivery, with some women expressing preference for traditional practices and other women wishing to deliver at a facility but deterred from doing so by security concerns and poor quality of care available in their area.

Geographic access and availability of transport

In Ragh District (Badakshan), the most remote and mountainous of the four study districts, the rugged terrain makes it very challenging for women to access health facilities. Descriptions of improvement in maternal health service availability varied substantially with remoteness and topography within the district. Those living towards the center of Yawan district, in relatively close proximity to the Comprehensive Health Center and the road to the provincial capital, noted that ten years ago all births took place at home but now women prefer to deliver with the midwife at the clinic. However, for most residents of the three districts that constitute the Ragh study area,

access remains difficult, limited to un-maintained roads and small trails in the summertime and often completely inaccessible due to heavy snowfall up to six months of the year. Those living farther from the district center explained that women give birth in the home with elder family members but seek care in the event of severe complications. Weather permitting, male family members will organize large groups of neighbors (sometimes as many as 20-25 men) to help them carry women experiencing obstetric complications on a ladder or make-shift stretcher to the closest clinic or to the district center where they can arrange a vehicle to transport them to the Provincial Hospital in Faizabad.

> *There is now a BHC in Pas Pul but for villages that are six, eight, ten hours distance from the clinic, it is as if nothing has changed. There is no transportation to take women with obstetric complications from these villages to the clinic except for men to carry the patient on their shoulders...*
>
> – Midwife, Badakshan

Rugged terrain and distance were not described as barriers to care seeking in any of the three other study districts. However, in other districts, delays in reaching a facility were more commonly associated with challenges in finding a car to borrow, or paying for a taxi. In addition, in Kabul City, the most densely populated and developed of the study districts, some community members reported delays in reaching a facility due to traffic.

Security

National policymakers reported ongoing insecurity as reason for limited access to health services in some areas of the country. Insecurity was the primary barrier to facility delivery reported in Maiwand district of Kandahar. There was universal agreement among key informants and focus group participants from Maiwand that security had worsened, and is now a significant barrier to care seeking because no one is allowed to travel within the district or on the road to Kandahar City at night. Nearly all community members interviewed or participating in focus group discussions highlighted security concerns, including fighting between armed opposition groups

and international forces, landmines, and other explosions. As a community member from Maiwand district explained,

> *Sometimes if we have a problem during the day we might go to the clinic or hospital, but during the night American soldiers and Taliban block the village roads and do not give us permission to go out from home, so whatever happens to us – if we become sick and die – it is still mandatory to stay at home.*
>
> – Recently delivered woman, Kandahar

Insecurity was also mentioned as a barrier to care seeking by community members in Alisheng district (Laghman). Focus group discussion participants from one community expressed fear of traveling at night, and difficulty finding a taxi driver willing to work at night, because of criminal and insurgent activity. In another community, the village elder explained that international forces often close roads in the area to conduct military operations, preventing any travel, including referral of patients to the Provincial Hospital or to the closest Regional Hospital in Nangarhar province. Insecurity was not reported as a constraint to service provision or care seeking in Kabul or Badakshan study districts.

Discussion

Although Afghanistan has made impressive improvements in overall coverage of maternal health services over the last decade, additional progress is needed to ensure that all pregnant women have access to obstetric care. On a national level, policy-makers must decide how to assign financial, material and human resources most effectively. Differences in health system reach and barriers to intrapartum care provision and utilization across the four districts in this study highlight the complexities of health policy planning and resource allocation in conflict-affected countries like Afghanistan, and suggest that although the BPHS aims to improve equity and efficiency of health service delivery, the current service delivery model that allocates resources based on district population size may not be an effective approach for scaling up maternal health services in hard-to reach areas.

Addressing challenges intrapartum care scale-up in extremely remote settings

Distance to health facilities is a known determinant of maternal health service utilization in Afghanistan, and globally.[112] [62] [171] [52] A recent review of strategies for improving reproductive, maternal and child health in difficult to access mountain locations found that extremely mountainous areas in many low and middle income countries represent the most extreme experiences of barriers to service utilization and suggests that actions with 'intensity proportionate to disadvantage' may be required to see any significant change in health service coverage and outcomes.[172] Barriers to intrapartum care identified in Ragh district show that although utilization of health services is a function of both patient demand and supply, limited availability of services is a major constraint to utilization in remote areas, and continued investment in the current service delivery model may not bring the improvements needed to reduce maternal mortality in these settings. Lessons could be learned from Nepal, whose *Remote Area Guidelines for Safe Delivery* provides approaches adapted to conditions in remote and difficult parts of the country, especially in the mountains.[173]

It is often assumed that there is a trade-off between efficiency and equity – targeting more remote populations costs more money per person and is therefore less efficient. More costly outreach, more staff time and other resources may be required to reach people in remote areas, thus more context specific planning and modification of BPHS budgets and resource allocation at the provincial or district level may be necessary to extend coverage of essential maternal care services to hard to reach populations.[174] Although not yet introduced in the RAMOS study districts, a number of strategies have been piloted to expand access to health services in Afghanistan, including Maternity Waiting Homes, Mobile Health Units, Family Health Houses, and telemedicine programs, but the level of resources needed to address gaps in maternal health coverage in the most remote areas and feasibility of rapid scale-up in a country with substantial health worker shortages still needs to be evaluated.

It is estimated that the direct obstetric complications accounting for approximately 75% of maternal deaths occur in up to 15% of pregnancies. Although these complications are difficult to predict and prevent, investment in early detection and community-based treatment strategies for this sub-set of women may be more effective than promotion of skilled birth attendance for all pregnant women in remote areas. Research suggests that antenatal care can contribute to maternal mortality reduction when used to detect risk factors for complications such as high blood pressure, educate women to recognize obstetric danger signs, and advise families on the appropriate time and place to seek referral care.[175-177] As in many other settings, hemorrhage is by far the leading cause of maternal deaths in Afghanistan (56%), followed pre-eclampsia/eclampsia (20%) and prolonged or obstructed labor (11%). The percentage of maternal deaths attributed to sepsis (5%) appears to be relatively low, as is the percentage attributed to pre-existing conditions or diseases aggravated by pregnancy and delivery (5%).[178]

Early distribution of misoprostol, a generic heat-stable uterontic that can be orally administered in tablet form, during pregnancy is increasingly recognized as a safe and effective strategy for preventing postpartum hemorrhage during home deliveries in low-resource settings, including Afghanistan.[179-183] The World Health Organization and international professional associations recommend when active management of the third stage of labor cannot be safely performed, misoprostol should be offered to women for oral administration by community or lay health workers trained in its use to prevent postpartum hemorrhage.[184,185] However, according to the current Reproductive Health Policy, trained community health workers can distribute misoprostol with its education package to women and their family based on nationally accepted protocol under close monitoring and effective supervision only in selected areas of Afghanistan.[132] To effectively reduce maternal mortality due to postpartum hemorrhage in the most remote parts of the country, training and supply of misoprostol to community health workers should be

prioritized along with education of pregnant women and their families on its use during antenatal care and home visits.

To prevent eclampsia, the Ministry of Health in Jamaica successfully implemented a program to increase early identification and referral of women at high risk of developing preeclampsia to facilities with expertise on treating hypertension and when to induce labor in women with preeclampsia. Primary antenatal care clinics were given clear instructions for referring patients to a high risk antenatal clinic or hospital and pregnant women were counseling using a pictorial card they kept to guide recognition and response to prodromal symptoms of imminent eclampsia.[175,186] A similar strategy could be adopted in the most remote areas of Afghanistan, with a focus on education of pregnant women and family members on danger signs of pre-eclampsia/eclampsia, identification of high risk women during antenatal care visits and targeted support for these women to seek care at comprehensive health centers or hospitals as needed.

In Afghanistan, as in many other countries, birth is believed to be a natural phenomenon that does not require medical care, and facility-based deliveries are only considered when complications arise. In cases of prolonged or obstructed labor, skilled care may only be sought after delivery fails to occur at home. A recent study in Bangladesh found that delays in care seeking in cases of prolonged or obstructed labor were attributed to confusion over the onset of labor, power processes inhibiting women's disclosure of labor symptoms, the practice of 'waiting for delivery', and preferences for home birth. Many women experienced confusion over the onset and course of labor, and did not realize that non-delivery after a considerable lapse of time signaled a complication. Rather they simply experienced increasing resource depletion until their condition was no longer tolerable.[187] These findings, coupled with the geographic challenges and social norms observed in Afghanistan, suggest a need for education of all pregnant women and their family members, particularly female kin likely to be present during home delivery, to recognize the onset and progression of normal labor, identify the occurrence of abnormally long labor, take

suitable actions to prevent maternal exhaustion, and make timely decisions about care-seeking when necessary. This could also be done by trained community health workers in each village, to ensure that messages reach women who do not receive skilled antenatal care at higher level primary health care facilities.

Finally, improving the coverage of intrapartum care in remote and otherwise hard to reach areas may not be possible without increased attention to service quality and investment in other types of social programming.[188] Study participants in less remote areas reported perceptions of poor quality care and disrespectful treatment by service providers as reasons for electing to bypass nearby facilities for higher-level hospitals or private facilities. Recognizing the importance of interpersonal aspects of care and planning services in a way that supports positive provider-patient interactions has been seen to increase the acceptability and uptake of services.[158 189] Research also shows that women's empowerment, involvement in household decision-making, educational status and wealth all have positive impacts on maternal health. Despite overall improvements in access and uptake of services in Afghanistan over the last decade, norms around childbirth still include delivery at home. Without the onset of complications or expectation of a difficult delivery, seeking a skilled birth attendant may not be considered important. Further community mobilization that emphasizes the importance of planning for delivery, identifying danger signs of obstetric complications, and delivering in a health facility with a skilled attendant whenever possible will be necessary to minimize deaths associated with decision-making and transport delays.

Addressing challenges to intrapartum care scale-up in conflict settings

The BPHS approach is designed to facilitate the rapid scale-up of standardized health services in post-conflict settings. However, the context in Maiwand district at the time of this study cannot be considered 'post-conflict'; the frequency of security incidents, restrictions on movement and

communications, and limited functionality of vital institutions and infrastructure all point to classification of the district as a protracted crisis setting. In fact, Kandahar province records the most security incidents out of any province in Afghanistan, the area stretching from Kandahar City west to Lashkar Gah through Maiwand district is notable for a large number of conflict incidents, some attributed to the desire of armed groups to control smuggling routes from Pakistan to Iran through this area.[190]

Some argue that improved security may be essential before strategies to impact health equity can be employed. [35] Others argue that developing informed strategies to protect and promote health during and after armed conflict should be a global priority. [83] There is no debate, however, over the fact that some areas of Afghanistan remain conflict settings and that the reach of BPHS services to these areas is limited. The lack of female health professionals in insecure study areas was a major obstacle to skilled birth attendance, compounded by low levels of mobility, general distrust in the health system, and fears of safety and security. Barriers expressed by study participants in Kandahar highlight the need for innovative strategies to expand health service coverage in conflict affected districts. However, there is a limited evidence base on how to effectively deliver health services in areas with ongoing conflict. [36] [83] [191] There is need for research into approaches to strengthening the resilience of local health systems, and developing new models of training, supporting and retaining health workers to deliver services in insecure settings.

Measuring progress at a sub-national level

A recent study on the benefits and cost-effectiveness of strategies to reduce maternal mortality in Afghanistan found that because factors such as the number of skilled birth attendants, reliable transport and availability/quality of emergency obstetric care facilities vary greatly across the country, contextualizing analyses of progress at a sub-national level is of critical importance.[107]

Population-based studies designed to be representative at a national or even regional level that may not provide practical guidance for policy makers and resource allocation; future studies should follow the precedent by the two most recent National Risk and Vulnerability Assessment and Afghanistan Health Survey rounds which were designed to be representative at the provincial level.[76,192]

In addition, modification of current benchmarks for progress towards maternal health service coverage may help stakeholders monitor the reach of intrapartum care services and identify areas in need of additional support or new strategies. Benchmarks for the number of facilities needed for EmOC are generally given in relation to the population and the number of births, but do not account for the size or type of facility.[193] This introduces ambiguity when comparing actual numbers of facilities with the benchmarks. For instance, there may be an apparently sufficient number of facilities at a national level, but these may still not be enough to serve all women in need; conversely, in urban areas, a few large facilities may readily meet needs.

Data from Zambia and Sri Lanka suggest that health professional density has more discriminatory power than health facility density as an indicator for maternal health service coverage.[194] The World Health Organization has also raised the issue of geographic accessibility of facilities, proposing a larger number of lower level facilities for more dispersed populations and discussing the trade-off between efficiency, quality and accessibility. There are no clear guidelines, however, to apply to different contexts. Establishments of BPHS standards for health facility coverage based on population density as well as catchment population could help inform more context specific planning.

Strengths and limitations

This study contributes to understanding the complex challenges faced by those who plan and manage health services in Afghanistan by illustrating the challenges of intrapartum care provision

and utilization in four distinctly different parts of the country. It is not intended to be representative of all districts or provinces, but does represent the diversity of challenges faced by women providing and seeking maternal health services in Afghanistan. Previous research investigating barriers to institutional delivery and quality of care at facilities in Afghanistan has only examined conditions at specialty maternity hospitals in Kabul city and at a regional referral hospital in Herat, where barriers to care seeking, accessing a facility, and receiving care once at the facility may be quite different from those in more remote or insecure areas.[58,62] This study contributes to the increasing number of studies on safe motherhood initiatives, a small number of which are conducted in conflict-affected settings, by triangulating data from a variety of sources to provide a more comprehensive illustration of the barriers to intrapartum care provision and utilization at a district-level.

There are also limitations that should be considered when interpreting these findings, some of which are an element of any study involving qualitative and secondary data collection, and others which are unique to conducting research in contemporary Afghanistan. First, description of the barriers to intrapartum care can only be as complete as the information provided. The number and type of documents collected from government and non-governmental organizations working in each of the study districts varied, as did the level of detail and completeness. For example, government health records did not list any deliveries at the Maiwand health center in 2010; this may because none took place, or may indicate other gaps in health system functionality such as reporting gaps. Second, due to security restrictions, the qualitative research team could not travel to Maiwand district; instead community members from three villages in Maiwand district were invited to travel to Kandahar City to participate in interviews and focus group discussions. Similarly, heavy snowfall during the data collection period prevented study teams from traveling to Raghistan or Kohistan areas of Ragh; consequently community members from three villages of

Yawan were interviewed, which may not capture perspectives that are representative of experiences of villages throughout the district.

Conclusion

This study of barriers to intrapartum care provision and utilization in four districts of Afghanistan shows that within-country (and even within-province and within-district) conditions can vary significantly enough to warrant different service delivery strategies. Now that initial gains in health service coverage, skilled birth attendance and EmOC availability have been achieved in some areas of Afghanistan, strategies must be adapted to address the barriers in areas where scale-up of intrapartum care coverage has been less effective, particularly the most remote and conflict-affected areas. In the most remote areas where resources are scarce and access to health services is limited, investment in early detection and community-based treatment strategies for women with risk factors for obstetric complications may be more effective than promotion of skilled birth attendance for all pregnant women. In areas where insecurity is the major barrier to utilizing maternal health services, entirely new models of training, supporting and retaining health workers to deliver services may be needed.

Table 6.1: Individual and group interviews conducted by study district

Kabul City, Kabul:	Alisheng District, Laghman:
10 individual & 6 group interviews • 3 village elders • 5 recently delivered women • 3 groups of reproductive age women • 3 groups of reproductive age men • 2 specialty hospital directors • 1 province level MoPH official	**12 individual & 6 group interviews** • 3 village elders • 3 recently delivered women • 3 groups of reproductive age women • 3 groups of reproductive age men • 1 comprehensive health center-based midwife • 1 comprehensive health center-based doctor • 1 provincial referral hospital director • 1 district-level MoPH official • 2 provincial level MoPH officials
Maiwand District, Kandahar:	**Ragh District, Badakshan:**
12 individual & 6 group interviews • 3 village elders • 3 recently delivered women • 3 groups of reproductive age women • 3 groups of reproductive age men • 1 comprehensive health center-based midwife • 1 comprehensive health center-based doctor • 1 provincial referral hospital director • 3 provincial level MoPH officials	**9 individual & 3 group interviews** • 1 village elder • 4 recently delivered women • 1 group of reproductive age women • 2 groups of reproductive age men • 1 basic health center-based midwife • 1 provincial referral hospital director • 2 provincial level MoPH officials
National	
5 individual interviews with MoPH officials	

Table 6.2: Maternal health service availability in RAMOS study districts in 2010

	Kabul City, Kabul	Alisheng District, Laghman	Maiwand District, Kandahar	Ragh District, Badakshan
District characteristics				
Population	3,289,000	68,153	58,254	87,400
Area	425 km^2	754 km^2	2,858 km^2	2,324 km^2
Public health facilities				
Number of facilities (by type)*	47 (24 BHC, 16 CHC, 3 DH, 4 SH)	3 (2 BHC, 1 CHC)	1 (1 CHC)	4 (2 BHC, 1 CHC, 1 CHC+)
Facility density (population)	1 per 69,978	1 per 22,727	1 per 58,524	1 per 21,850
Facility density (geographic)	1 per 9km^2	1 per 251 km^2	1 per 160 km^2	1 per 580 km^2
Human resources for maternal health				
Number of midwives	677 (1 per 4,858 population)	5 (1 per 13,361 population)	1 (1 per 40,700 population)	7 (1 per 12,486 population)
Midwifes per 10,000 population	2.05	0.73	0.17	0.80
Number of female doctors	218 (1 per 15,097 population)	0	0	3 (1 per 29,133 population)
Female doctors per 10,000 population	0.66	0	0	0.34
Midwife to doctor ratio	3:1	N/A	N/A	2:1
Health facility utilization**				
Number of new ANC visits reported in HMIS (% of expected birth)	64,001 (51%)	1,843 (71%)	0	2,261 (68%)
Number of facility deliveries reported in HMIS (% of expected birth)	79,941 (64%)	569 (22%)	0	287 (8.6%)
Number of cases with direct obstetric complications reported in HMIS (% of expected birth)	5,890 (4.7%)	21 (0.8%)	0	17 (0.5%)
Number of cases with direct obstetric complications referred out to other facilities for care	49	8	0	10
EmOC availability				
Expected CEmONC availability	Yes	No	No	Yes
Distance to closest CEmONC referral facility in provincial capital	N/A	21 km to PH (~45 min. drive year round)	80 km to RH (~1.5-2 hour drive)	120 km to PH (~6-8 hour drive in summer months)

* BHC = Basic Health Center, CHC = Comprehensive Health Center, CHC+ = Comprehensive Health Center upgraded to include some functions of a district hospital; DH = district hospital; SH = specialty hospital;

** Health facility utilization data is extracted from the government's Health Management Information System and therefore does not include data from private facilities or any BPHS facilities not complying with government reporting requirements. Percentages are based on expected number of births assuming a crude birth rate of 38.11 per 1,000 persons in the population at mid-year.

Figure 6.1: Map of RAMOS study areas

Kabul City, Kabul is the capital and largest city in Afghanistan. Since 2001 it has experienced rapid growth and expansions of health services, both public and private, improvements in transportation, and until recently, remained relatively free of insecurity and violence.

Ragh District, Badakshan, is located in a remote region in the Hindu-Kush mountains that is snowbound for nearly half the year.

Maiwand District, Kandahar is located approximately 50 kilometers from Kandahar City. Since 2001 it has remained extremely insecure with a history a military operations, criminality, and weak government structures to manage public services.

Alisheng District, Laghman is a semi-rural, mountainous district located east of Kabul. There have been improvements in transportation and health services since 2001, however the security situation remains fragile with miltant groups passing through the district en-route from Pakistan to southern Afghanistan.

Chapter 7 Conclusions

The aims of this dissertation were to explore the relationship between implementation of standardized health service delivery packages and provision of essential maternal health services in Afghanistan; and to gain an understanding of the range of factors that facilitate and hinder the reach of these services to the women who need them. Each of the three papers assessed skilled birth attendant coverage from a slightly different perspective. Together, they show that Afghanistan has made extensive efforts to scale-up skilled birth attendance, and in some regions much progress has been achieved. However, progress has been uneven and inequitable. Strategies must be adapted to address weaknesses in the current health system, sustain achievements in women and children's health made over the last decade, and expand efforts to reduce preventable maternal deaths across the country.

Paper 1 used routine data sources to examine the relationship between implementation of a Basic Package of Health Services (BPHS) and skilled birth attendance from 2006 through 2010. Although trends in both primary health care system performance and skilled birth attendance showed substantial improvements on a national level, a closer look at provincial-level trends and coverage levels reveal substantial disparities. Papers 2 and 3 were not national in scope, but both provide important insights into why national service delivery strategies have been more successful in some areas of the country than others. Paper 2 used data from a 2010 household survey to examine the determinants of skilled birth attendance in nine relatively stable and secure provinces in north-central Afghanistan. Findings illustrated the inequities in health service coverage based on wealth and education status, and highlighted the importance of understanding patterns of care-seeking. Paper 3 compared barriers to essential maternal health service coverage in four distinctly different districts of Afghanistan, illustrating the complexity of putting national

strategies into practice at a local level and providing recommendations on how to improve efforts to extend services to hard-to-reach areas.

Summary of results

National trends

Results from Paper 1 show a direct relationship between overall health system performance and skilled birth attendance coverage in Afghanistan. Analysis of provincial-level data shows a significant increase in both indicators over the period from 2006 through 2009/10, and an improvement in the proportional odds of skilled birth attendance with increases in the percent of health system performance benchmarks met. Across all 34 provinces, the proportion of expected births delivered at health facilities increased significantly from an average of 14% in 2006 to 26% in 2009/10, with an average annual increase of 4.7%. Omitting the five provinces (Helmand, Kandahar, Paktika, Uruzgan and Zabul) that were excluded from National Health Service Performance Assessments (NHSPA) due to security constraints, the median percent of births delivered at health facilities increased significantly from 18% in 2006 to 41% in 2008, and dropped to 36% in 2009/10.

The peak in health system performance and skilled birth attendance in 2008 is concerning. Although the study period is too short to indicate whether the drop in performance and skilled birth attendance coverage after 2008 is an indication of a downward trend, examination of secondary data published after this analysis was conducted suggests that this is indeed the case. Stagnation could suggest that the low baseline allowed for rapid scale up of services but extending services to hard-to-reach areas remains a challenge. However, a decline in service coverage may be an indication of more serious problems given that the strength of a health system could be evaluated by its ability to adapt to changing socio-political conditions and demonstrate resilience to other contextual shocks. Continued monitoring and analysis of trends

since 2010 will shed more light on the impacts of worsening security and provide a deeper understanding of the relationship between health system performance and skilled birth attendance over time.

Sub-national disparities

Descriptive results presented in Paper 1 also show that while overall health conditions in Afghanistan have dramatically improved over the last decade, aggregated national data may hide substantial disparities. While the mean and median percent of births delivered at health facilities increased significantly from 2006 to 2009/10, the differences in coverage between the provinces with the highest and lowest skilled birth attendance rates actually grew during the study period. In addition, it is important to note that skilled birth attendance rates did not improve or did not improve substantively in all provinces. At the peak of health conditions in 2008, skilled birth attendance had dropped in one province, improved less than 5% in three provinces, and increased more than 25% in three provinces. The growing disparity in maternal health service coverage and improvement across provinces suggests that the "one-size-fits-all" approach inherent in standardized service delivery packages, with funding allocation and facility location based on population size, are not adequately responsive to population needs in all areas of the country. Provinces where maternal health service delivery efforts appear to be most effective are Laghman and Logar, where at least half of all births occurred in facilities in 2008, as well as Nimroz where the skilled birth attendance rate increased from 15% in 2006 to 29% in 2008 and 57% in 2009/10. Of concern are Badghis, Helmand and Uruzgan, all of which reported at least 90% of expected births still occurred outside of facilities in 2010, and Sar-i-pul which reported a decline from 38% of births occurring at health facilities in 2006 to 22% of births occurring at health facilities in 2009/10. Although low service coverage in Helmand and Uruzgan could be attributed to insecurity in those provinces, Kandahar, which was also excluded from health system performance assessments for security reasons, reported a 17% improvement in skilled birth

attendance rates over the study period, suggesting that it is possible to improve women's access to essential health services, even in difficult operating environments. Data was not available to examine district-level health system performance or maternal health service coverage, however it is important to consider that provincial level analysis may similarly conceal variations in coverage across districts where services are managed by the same implementing agency in coordination with the same local authorities, and to encourage triangulation of multiple data sources to investigate inequities in essential maternal health service coverage. A recent Humanitarian Needs Assessment reinforces these findings, drawing attention to the fact that are significant variations in the health situation between districts and sub-districts within the same province; approximately half of the districts that the United Nations Office for Coordination of Humanitarian Affairs ranked as having high or very high health needs are found in provinces that have been ranked overall as medium or low.[43]

Results from Paper 2 highlighted disparities between utilization of skilled birth attendants by wealth status, education level and age in nine relatively stable and secure provinces of north-central Afghanistan. The odds of skilled birth attendance were 79% higher among women from the highest wealth quintile compared with the lowest, and 84% higher for women who could read compared with those who could not. Considering that 36% of Afghans live below the poverty line and only 13% of Afghan women over age 15 are literate[76], these inequities in coverage of health services add further evidence to suggest that achievements in terms of national or provincial population averages do not necessarily represent improvements for the population as a whole. The drive for a greater focus on equity in human development has gathered momentum at a global level. The United Nations Commission on Information and Accountability for Women and Children's Health places equity as one of the cornerstones of its accountability framework, suggesting that indicators on reproductive, maternal and child health be disaggregated for equity

considerations and that indicators be stratified by social features such as wealth quintiles, urban/rural residence and education status in order to monitor progress.[195]

Conditions that facilitate and hinder essential maternal health service coverage

Paper 1 showed that approximately half of the variation in skilled birth attendance across provinces can be explained by provincial level health system performance while the other half is likely due to other differences between provinces. It also showed that service provision capacity measures, including those not directly related to reproductive and maternal health care, were more strongly associated with skilled birth attendance than indicators for other areas of performance.

Paper 2 did not show any direct linkages between health facility characteristics and individual likelihood of skilled birth attendance, but highlighted the association between skilled antenatal care and skilled care at delivery and drew attention to the importance of male involvement in birth preparedness. Results also illustrated why studies assuming women seek care at their closest primary health care facility may lead to misinterpretation of care-seeking patterns or mask the relationship between perceptions of service quality and skilled birth attendance utilization. Findings reveal that the majority of women who deliver with skilled attendants bypass the nearest primary healthcare facility to deliver at a hospital or private clinic.

Finally, paper 3 highlighted the importance of context when evaluating factors that facilitate and hinder maternal health service coverage. The reach of BPHS services varied substantially across study districts, with only two of the four districts having a clinic with a female doctor or resources needed to provide comprehensive emergency obstetric care. However, even in districts that met BPHS standards for infrastructure and staffing needs, contextual factors played a major role in whether women planned to delivery at a facility or only decided to seek care upon detection of complications. For example, the majority of women in densely populated Kabul city delivered at

health facilities, with facility choice heavily influenced by costs and perceived quality of care. In contrast, women in mountainous and sparsely populated Ragh district (Badakshan) tended to deliver at home, as remote villages in the district could be as far as eight hours walk from the comprehensive health center in the district center, which was then at least six hours drive from the provincial hospital during summer months when the district is not snowbound.

Distance to a facility, the level of care available there, and community mobility were also major determinants of skilled birth attendance in the two districts that did not have female doctors or facilities equipped to provide emergency obstetric care. However, the barriers faced in these districts illustrated very different challenges in scaling up coverage of essential maternal health services from those faced in the two districts described above. For example, women in rural Alisheng district (Laghman) preferred to deliver at home, and care-seeking patterns were more determined by the level of care available at facilities than perceptions of service quality. Women who did see professional care at birth tended to bypass the two basic health centers and one comprehensive health center in the district (none of which had female doctors) to seek care at the provincial hospital or a neighboring province's regional hospital, but only in the event of complications or when advised to do so by a doctor. In contrast, women in Maiwand district (Kandahar) tended to deliver at home because armed conflict in the province hindered both health service provision and mobility. Together, the three papers show that while the health system has a critical role to play in narrowing some gaps in coverage and improving quality of care, factors outside of the health sector are also key to improving health outcomes and reducing inequalities.

Strengths and limitations

A major strength of this thesis is that it goes beyond national statistics to illustrate the complex challenges of health policy and program implementation at a provincial, district and community level. By highlighting the gaps in essential maternal health service coverage and identifying areas for further research, it draws attention to the need for continued international support to health

services in Afghanistan and to the need for modification of current strategies to address marginalized populations' needs.

A limitation of this thesis in terms of its relevance for health program and policy stakeholders is that it is based on data collected two to three years ago, and may not reflect the current situation in Afghanistan. However, while stakeholders have continued to invest in health system strengthening efforts and new projects have been introduced to improve access to maternal health services since data used in these studies was collected, the security situation has been deteriorating, and findings related to provision of essential maternal health services and care seeking in conflict-affected areas may be more relevant than ever.

There are also limitations inherent in the use of secondary data sources and qualitative research methods discussed in chapters 4, 5 and 6. These limitations are compounded when findings of individual studies are consolidated to draw overall conclusions. However, it can be argued that fragmented data and a high degree of ambiguity shape all knowledge construction in conflict affected settings, and that triangulation of data sources is a step towards overcoming problems of accessibility, bias and representation that are characteristics of many research efforts in conflict-affected areas.[196]

Policy recommendations

Further improvements in essential maternal health coverage will require continued health system strengthening, increasing access to services, and improvements in social cohesion and community-facility linkages. Specific recommendations in each of these areas are as follows:

<u>Continued investment in strengthening human resources for health</u>

Improving access to essential maternal health services requires a comprehensive human resource strategy, including expansion of the health workforce, careful deployment of midwives and female doctors to ensure that staff are being sent where they are needed most, and appropriate

support packages to encourage retention in their jobs.[197] The Health for All Afghans National Priority Program document recognizes that the country's health infrastructure and health care workforce is not growing at a fast enough rate to keep up with population growth and demand. National shortages are compounded by geographic imbalances in the health care workforce concentrated in cities and peri-urban areas and a significant shortage of female staff in rural areas.[198] Although the government has expressed commitment to continued investment in pre-service education and activities to improve retention of midwives already deployed in rural areas, decreases in donor funding threaten the existence of midwifery programs in Afghanistan. According to a recent evaluation, only 22 of the 34 midwifery schools existing in 2010 remained in operation as of mid-2013.[22] Continued and increased investment in training new community and hospital midwives is essential for building up the health workforce necessary to fill gaps in facility staffing and scale up skilled birth attendance across the country.

In addition, compensation and incentive packages should be reevaluated, as staffing gaps in rural areas suggest that current incentives are not sufficient to draw and retain staff in some areas.[85] Revised support packages might include more substantial financial incentives, and with additional incentives for working in districts that are both remote and insecure, as well as non-financial incentives such as family housing, rotation to other levels of facilities and other settings for professional development, and on-the-job training opportunities.

Modification or supplementation of BPHS model for extremely remote and insecure areas

A "flexibility clause" was added to the 2010 BPHS revision, allowing implementing agencies to address variations between localities, local demand, and other local conditions requiring flexibility.[199] It is not clear, however, how this is accounted for in contracting arrangements and funding allocation, or to what extent modifications to the standardized population-based BPHS delivery model are being implemented in remote and insecure areas.

What's more, none of the initiatives to expand access to BPHS and EPHS services outlined in the 2012 Health for All Afghans National Priority Program address the inadequacies of the population-based service delivery model in extremely remote or insecure areas. Priority efforts include expanded access to health services for nomadic population, establishment of health services within prisons, integration of child survival services (growth monitoring and integrated management of childhood illnesses) in BPHS services, and increased focus on the delivery of public nutrition, mental health, disability and physical rehabilitation components of the BPHS. Apart from the addition of fixed health centers in 10 provinces and an additional mobile health team in each of 20 provinces to increase health service coverage among nomadic Kuchi populations, all of the priority programs focus on expanding the scope of services available but not expanding coverage of the most basic services to populations currently without access.[198]

Intrapartum care seeking is not likely to increase in extremely remote areas unless health facilities are located closer to women's homes or effective, efficient and affordable transport becomes available. Recognizing that there are trade-offs in allocating resources to construct additional facilities or deploy staff from a limited human resource pool to sparsely populated areas, potential mechanisms for doing this could be to establish maternity waiting homes at strategically located district hospitals, and to deploy female doctors and midwives with resources to provide emergency obstetric care to strategically selected comprehensive health centers (effectively increasing comprehensive health centers to function as district hospitals as has already been done in some areas). Given patterns of utilization documented in Paper 2 and Paper 3, investing in establishment of additional sub-centers and basic health centers staffed by a community midwife may not be as effective as increasing access to higher level facilities providing comprehensive emergency obstetric care. Projections using geographic information system modeling in rural Ethiopia suggest that upgrading a small number of strategically selected facilities and providing transportation from facilities without emergency obstetric care could dramatically increase

proportion of women with complications that are able to access life-saving care.[152] Also, the mobile health delivery system in rural Afghanistan could be revamped and targeted to provide regular services to designated communities that face extreme difficulties in accessing care, and equipped with resources to arrange transportation for expectant mothers to maternity waiting homes or provide emergency referral transport when needed.

There also appears to be a disconnect between health sector development strategies and barriers to essential health service provision and utilization in areas of the country with ongoing conflict. As a recent assessment of health sector progress in Afghanistan noted, the government has demonstrated indications of flexibility and responsiveness to population needs with the BPHS modifications to tailor service delivery strategies for rural areas, but also a lack thereof in treating insecurity as a hindrance and not a major impediment. [200] Since data collection for this thesis was completed in 2011, political instability and insecurity have spread from a few Southern and South Eastern provinces to other areas, including the capital city, posing serious threats to general peace and development, including health service coverage. According to a recent United Nations report, the nature of the ongoing conflict shifted over 2012 and 2013 to more broad targeting of civilians, with women and children often caught in the crossfire, and increasingly restricted freedom of movement in armed-opposition group controlled areas.[201] Some argue that improved security may be essential before strategies to improve health service access and equity can be employed, while others maintain that improved basic service delivery may contribute to increased stability, in that fewer inequalities as a result of improved service delivery may reduce the chances that conflict will be sustained.[35,202] There is little mention of security in any national health policies or strategy documents, however, other than to recognize that security remains a barrier to service delivery in some areas. More explicit recognition of the risks and challenges faced by health care workers is needed, however, along with efforts to strengthen the resilience of functional health services at a

grassroots level and national and international support for alternative models of service delivery in areas currently without access.

As a starting point, resources could be available to implementing agencies with tangible strategies for increasing access to services in remote or insecure areas on a district-by-district basis. This could be incorporated into BPHS and EPHS contracts, or established as a separate pool that would allow for the release of funds to address needs identified between contracting cycles.

Establishing functional referral systems to address population needs

Strengthening community-facility linkages and engaging household decision-makers in birth preparedness efforts are essential steps towards an effective referral system that ensures that all women with obstetric complications have access to necessary care in time to survive. The establishment and continued support of village health councils has been an effective mechanism for increasing acceptability of care seeking in some areas, but will not help to facilitate referrals if women tend to bypass local primary health care facilities when they seek intrapartum care. As Kenneth Leonard, an economist who has studied extensive research on care seeking behaviors in rural Africa, explains, "active patients" do not automatically seek care at the closest or lowest cost provider, but rather seek high-quality care (even at higher cost) when they estimate that such care will significantly improve outcomes.[203] The high level of facility bypassing documented in Paper 2 suggests that the primary health care system may not be structured in a way that meets population needs, or that there are substantial gaps in the implementation of the BPHS that influence whether women plan to deliver with a skilled attendant, and the choice of facility for delivery.

Research in other settings has shown that a well-designed referral strategy can be coordinated with short, medium and long term human resources and infrastructure investment strategies to generate steady reductions in mortality and meet other important goals such as improving

equity.[152] Commitment from BPHS and EPHS implementers to establish flexible and responsive referral systems, including pathways for communication and transport across district boundaries and even implementing partner operational areas (provinces or clusters of districts within a province), could improve access to care and ensure timely arrival at facilities for women with obstetric complications. This could be facilitated with increasing communication and information sharing between management of primary health care facilities and hospitals, increased engagement of both groups with provincial health officials, and increased support to local health activists promoting facility delivery and involvement of husbands and families in birth preparedness efforts. In addition, tracing patterns of care seeking and using geographic information systems to map 'actual' catchment areas would help managers appreciate the artificiality of catchment areas boundaries and pressure implementing agencies to work jointly across districts, and provinces where necessary, to reduce travel delays to preferred facilities or improve the level and quality of care at bypassed facilities to encourage delivery at underutilized facilities.

Global implications

The research presented in this thesis has potential to impact public health programs and policy at different levels. At the national level, this study comes at an important point in time, when bilateral and multilateral donor agencies are reconsidering their strategies for engagement in Afghanistan. The recent Afghanistan Mortality Study reported maternal mortality figures far below any previous estimates that a number of world-renowned demography and maternal health experts have regarded as "too good to be true".[93,200,204] As any decline in maternal mortality must either be attributed to reductions in the number of pregnancies, the number of women experiencing complications or the number of women who experience complications and do survive, this study can help contextualize maternal mortality findings by illustrating trends in health system functioning and essential maternal health service provision at a provincial level. It

also has potential to identify strengths, weaknesses and areas for improvement in implementation of Afghanistan's Safe Motherhood Strategy, help guide MoPH strategies for continued health service package implementation, and shed light on the non-health conditions and infrastructure that accelerate the reach of maternal health services in different areas of Afghanistan.

On a global level, recent years have seen increasing interest in and analysis of ways in which donors, governments, and other organizations can deliver aid more effectively to strengthen healthcare systems in fragile and conflict-affected states. The challenge is in addressing essential and priority needs, while also supporting approaches that will strengthen systems and enable longer-term development. This thesis illustrates why the one size-fits-all approach inherent in standardized service delivery packages may be an effective way to rapidly introduce and scale up services, but may not be suitable as a permanent or long-term health sector strategy. Once a basic level of service provision capacity has been established, adaptations should be made, based on analysis of where system is succeeding in reaching goals and where it is not. Finally, this thesis adds to the growing body of literature on scaling up maternal and child health service coverage, filling gaps in research on the effectiveness of health system strengthening initiatives and linkages between health system performance and health outcomes in countries like Afghanistan, the Democratic Republic of Congo, South Sudan and Somalia. It also contributes to the growing number of case studies on safe motherhood initiatives, providing empirical evidence to support and contextualize the widely accepted understanding that functioning health systems are needed to reduce maternal and newborn mortality and improve health.

Bibliography

1. Hogan MC, Foreman KJ, Naghavi M, et al. Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5. *Lancet* 2010; **375**(9726): 1609-23.

2. Campbell OMR, Graham WJ. Strategies for reducing maternal mortality: getting on with what works. *Lancet* 2006; **368**(9543): 1284-99.

3. Burchett HE, Mayhew SH. Maternal mortality in low-income countries: what interventions have been evaluated and how should the evidence base be developed further? *Int J Gynaecol Obstet* 2009; **105**(1): 78-81.

4. Penn-Kekana L, McPake B, Parkhurst J. Improving Maternal Health: Getting What Works To Happen. *Reproductive Health Matters* 2007; **15**(30): 28-37.

5. Kongnyuy EJ, Hofman JJ, van den Broek N. Ensuring effective Essential Obstetric Care in resource poor settings. *BJOG* 2009; **116 Suppl 1**: 41-7.

6. Campbell OM, Graham WJ. Strategies for reducing maternal mortality: getting on with what works. *Lancet* 2006; **368**(9543): 1284-99.

7. WHO, Midwives ICo, Obstetrics IFoGa. Making pregnancy safer: the critical role of the skilled attendant. Geneva, Switzerland: World Health Organization; 2004.

8. Travis P, Bennett S, Haines A, et al. Overcoming health-systems constraints to achieve the Millennium Development Goals. *Lancet* 2004; **364**(9437): 900-6.

9. Hill PS, Mansoor GF, Claudio F. Conflict in least-developed countries: challenging the Millenium Development Goals. *Bull World Health Organ* 2010; **88**: 1.

10. High Level Forum on the Health MDGs. Health in Fragile States: An Overview Note: OECD, Development Co-operation Directorate, DCD, 2005.

11. Roberts B, Guy S, Sondorp E, Lee-Jones L. A basic package of health services for post-conflict countries: implications for sexual and reproductive health services. *Reprod Health Matters* 2008; **16**(31): 57-64.

12. United Nations Children's Fund (UNICEF). Best Estimates of Social Indicators for Children (1999-2005). New York: UNICEF, 2006.

13. Sondorp E. Case Study 1: A Time-Series Analysis of Health Service Delivery in Afghanistan. London, United Kingdom: DFID Health Systems Resource Center, 2004.

14. United Nations Population Fund (UNFPA). Afghanistan Reproductive Health Resources Assessment: Summary Findings and Recommendations. Kabul, Afghanistan: United Nations Population Fund, 2003.

15. Johns Hopkins Bloomberg School of Public Health (JHSPH), Indian Institute of Health Management Research (IIHMR). Afghanistan multiple indicator cluster survey 2003: report to the Afghanistan Ministry of Public Health. 2003.

16. Ministry of Public Health (MoPH). A Basic Package of Health Services for Afghanistan. Islamic Republic of Afghanistan: Ministry of Public Health; 2003.

17. Ministry of Public Health (MoPH). Essential Package of Hospital Services for Afghanistan, 2005/1384. Islamic Republic of Afghanistan: Ministry of Pubilc Health, 2005.

18. Sabri B, Siddiqi S, Ahmed A, Kakar F, Perrot J. Towards sustainable delivery of health services in Afghanistan: options for the future. *Bulletin of WHO* 2007; **85**(9): 649-732.

19. Belay T. Building on Early Gains in Afghanistan's Health, Nutrition and Population Sector: Challenges and Options. Washington DC, USA: The World Bank; 2010.

20. Chang CS, Bonhoure P, Alam S, Hansen P, Burnham G. Use of the Balanced Scorecard to Assess Provincial Hospital Performance in Afghanistan. *World Medical & Health Policy* 2010; **2**(1): 77-100.

21. Johns Hopkins Bloomberg School of Public Health (JHSPH), Indian Institute of Health Management Research (IIHMR). Afghanistan Health Sector Balanced Scorecard. Kabul: Afghanistan Ministry of Public Health, 2011.

22. Zainullah P, Ansari N, Yari K, et al. Establishing midwifery in low-resource settings: Guidance from a mixed-methods evaluation of the Afghanistan midwifery education program. *Midwifery* 2013.

23. United Nations Children's Fund (UNICEF). Afghanistan: Progress of Provinces. Multiple Indicators Cluster Survey 2003. Kabul, Afghanistan: UNICEF, 2004.

24. Johns Hopkins Bloomberg School of Public Health (JHSPH). Afghanistan Health Survey 2006: Estimates of priority health indicators for rural Afghanistan. Kabul: General Directorate of Policy and Planning, Ministry of Public Health, Islamic Republic of Afghanistan, 2008.

25. Afghanistan Public Health Institute (APHI/MoPH), Central Statistics Office (CSO), ICF Macro, Indian Institute of Health Management Research (IIHMR), (WHO/EMRO) WHOEMRO. Afghanistan Mortality Survey 2010. Calverton, Maryland, USA: APHI/MoPH, CSO, ICF Macro, IIHMR and WHO/EMRO, 2011.

26. Kim YM, Zainullah P, Mungia J, Tappis H, Bartlett L, Zaka N. Availability and quality of emergency obstetric and neonatal care services in Afghanistan. *Int J Gynaecol Obstet* 2012; **116**(3): 192-6.

27. World Health Organization (WHO). Report of the Scientific Peer Group on Health Systems Performance Assessment. Geneva, Switzerland: WHO, 2001.

28. World Health Assembly. Primary Health Care, Including Health System Strengthening. New York: World Health Organization, 2009.

29. Graham WJ. Now or never: the case for measuring maternal mortality. *Lancet* 2002; **359**(9307): 701-4.

30. Kerber KJ, de Graft-Johnson JE, Bhutta ZA, Okong P, Starrs A, Lawn JE. Continuum of care for maternal, newborn, and child health: from slogan to service delivery. *Lancet* 2007; **370**(9595): 1358-69.

31. Bailey P, Paxton A, Lobis S, Fry D. Measuring progress towards the MDG for maternal health: including a measure of the health system's capacity to treat obstetric complications. *Int J Gynaecol Obstet* 2006; **93**(3): 292-9.

32. Kruk ME, Prescott MR. The role of health systems and policies in promoting safe delivery in low- and middle-income countries: a multilevel analysis. *Am J Public Health* 2012; **102**(4): 645-50.

33. Muldoon KA, Galway LP, Nakajima M, et al. Health system determinants of infant, child and maternal mortality: A cross-sectional study of UN member countries. *Global Health* 2011; **7**: 42.

34. Macrae J, Zwi AB, Gilson L. A triple burden for health sector reform: 'Post'-conflict rehabilitation in Uganda. *Social Science & Medicine* 1996; **42**(7): 1095-108.

35. Waldman R. Health Programming in Post-Conflict Fragile States. Arlington, Virginia, USA: Basic Support for Institutionalizing Child Survival (BASICS) for the United States Agency for International Development (USAID), 2006.

36. Kruk ME, Freedman LP, Anglin GA, Waldman RJ. Rebuilding health systems to improve health and promote statebuilding in post-conflict countries: a theoretical framework and research agenda. *Soc Sci Med* 2010; **70**(1): 89-97.

37. Rubenstein LS. Post-conflict health reconstruction: new foundations for US policy. Washington, DC: United States Institute of Peace, 2009.

38. Brinkerhoff D. From Humanitarian and Post-conflict Assistance to Health System Strengthening in Fragile States: Clarifying the Transition and Role of NGOs. Bethesda, Maryland, USA: Health Systems 20/20, 2008.

39. Newbrander W, Waldman R, Shepherd-Banigan M. Rebuilding and strengthening health systems and providing basic health services in fragile states. *Disasters* 2011; **35**(4): 639-60.

40. Bryce J, Victora CG, Boerma T, Peters DH, Black RE. Evaluating the scale-up for maternal and child survival: a common framework. *Int Health* 2011; **3**(3): 139-46.

41. Islamic Republic of Afghanistan. Afghanistan National Development Strategy: 1387-1391 (2008-2013). Islamic Republic of Afghanistan, 2007.

42. Barfield T. Afghanistan: A Cultural and Political History. Princeton, New Jersey: Princeton University Press; 2010.

43. United Nations Office for Coordination of Humanitarian Affairs (OCHA). 2014 Humanitarian Needs Overview: Afghanistan. Kabul, Afghanistan: United Nations Office for Coordination of Humanitarian Affairs, 2013.

44. Ministry of Public Health (MoPH). A Basic Package of Health Services for Afghanistan. Islamic Republic of Afghanistan: Ministry of Public Health, 2005.

45. Sondorp E, Palmer N, Strong L, Wali A. Afghanistan: Paying NGOs for Performance in a Post-Conflict Setting. In: Eichler R, Levine R, Performance-Based Incentives Working Group, eds. Performance incentives for global health: potentials and pitfalls. Washington DC: Center for Global Development; 2009.

46. Ministry of Public Health (MoPH). National Salary Policy for contracted in and contracted out staff. Islamic Republic of Afghanistan: Ministry of Public Health, 2005.

47. Edward A, Kumar B, Kakar F, Salehi AS, Burnham G, Peters DH. Configuring balanced scorecards for measuring health system performance: evidence from 5 years' evaluation in Afghanistan. *PLoS Med* 2011; **8**(7): e1001066.

48. Hansen PM, Peters DH, Niayesh H, Singh LP, Dwivedi V, Burnham G. Measuring and managing progress in the establishment of basic health services: the Afghanistan health sector balanced scorecard. *Int J Health Plann Manage* 2008; **23**(2): 107-17.

49. Arur A, Peters D, Hansen P, Mashkoor MA, Steinhardt LC, Burnham G. Contracting for health and curative care use in Afghanistan between 2004 and 2005. *Health Policy Plan* 2010; **25**(2): 135-44.

50. Edward A, Dwivedi V, Mustafa L, Hansen PM, Peters DH, Burnham G. Trends in the quality of health care for children aged less than 5 years in Afghanistan, 2004-2006. *Bull World Health Organ* 2009; **87**(12): 940-9.

51. Onishi J, Gupta S, Peters DH. Comparative analysis of exit interviews and direct clinical observations in pediatric ambulatory care services in Afghanistan. *Int J Qual Health Care* 2011; **23**(1): 76-82.

52. Steinhardt LC, Waters H, Rao KD, Naeem AJ, Hansen P, Peters DH. The effect of wealth status on care seeking and health expenditures in Afghanistan. *Health Policy Plan* 2009; **24**(1): 1-17.

53. Viswanathan K, Hansen PM, Rahman MH, et al. Can community health workers increase coverage of reproductive health services? *J Epidemiol Community Health* 2012; **66**(10): 894-900.

54. Currie S, Azfar P, Fowler RC. A bold new beginning for midwifery in Afghanistan. *Midwifery* 2007; **23**(3): 226-34.

55. Mansoor GF, Hill PS, Barss P. Midwifery training in post-conflict Afghanistan: tensions between educational standards and rural community needs. *Health Policy Plan* 2012; **27**(1): 60-8.

56. Smith JM, Currie S, Azfar P, Rahmanzai AJ. Establishment of an accreditation system for midwifery education in Afghanistan: maintaining quality during national expansion. *Public Health* 2008; **122**(6): 558-67.

57. Blaakman AP, Salehi AS, Boitard R. A cost and technical efficiency analysis of two alternative models for implementing the basic package of health services in Afghanistan. *Glob Public Health* 2013.

58. Khorrami H, Karzai F, Macri CJ, Amir A, Laube D. Maternal healthcare needs assessment survey at Rabia Balkhi Hospital in Kabul, Afghanistan. *Int J Gynaecol Obstet* 2008; **101**(3): 259-63.

59. Kandasamy T, Merialdi M, Guidotti RJ, et al. Cesarean delivery surveillance system at a maternity hospital in Kabul, Afghanistan. *Int J Gynaecol Obstet* 2009; **104**(1): 14-7.

60. Guidotti RJ, Kandasamy T, Betran AP, et al. Monitoring perinatal outcomes in hospitals in Kabul, Afghanistan: The first step of a quality assurance process. *J Matern Fetal Neonatal Med* 2009; **22**(4): 285-92.

61. Sundaram S. Antenatal and Delivery Care in Afghanistan: Knowledge and Perceptions of Services, Decision-Making for Service Use, and Determinants of Utilization. Baltimore, Maryland: Johns Hopkins University; 2011.

62. Hirose A, Borchert M, Niksear H, et al. Difficulties leaving home: a cross-sectional study of delays in seeking emergency obstetric care in Herat, Afghanistan. *Soc Sci Med* 2011; **73**(7): 1003-13.

63. Ministry of Public Health (MoPH). A Basic Package of Health Services for Afghanistan: 2005/1384. Islamic Republic of Afghanistan: Ministry of Public Health, 2005.

64. Koblinsky M, Kureshy N. Safe Motherhood Case Studies: Learning with Stakeholders in South Asia--An Introduction. *Journal of Health, Population, & Nutrition* 2009; **27**(2): 89-92.

65. De Brouwere V, Richard F, Witter S. Access to maternal and perinatal health services: lessons from successful and less successful examples of improving access to safe delivery and care of the newborn. *Trop Med Int Health* 2010; **15**(8): 901-9.

66. Ensor T, Cooper S. Overcoming barriers to health service access: influencing the demand side. *Health Policy Plan* 2004; **19**(2): 69-79.

67. Women Deliver. Focus on five: Women's health and the MDGs. New York, New York: Women Deliver, 2010.

68. Victora CG, Black RE, Boerma JT, Bryce J. Measuring impact in the Millennium Development Goal era and beyond: a new approach to large-scale effectiveness evaluations. *Lancet* 2011; **377**(9759): 85-95.

69. World Health Organization (WHO). Everybody's Business: Strengthening Health Systems to Improve Health Outcomes. Geneva, Switzerland: WHO, 2007.

70. Roberts M, Hsiao W, Berman P, Reich M. Getting health reform right: a guide to improving performance and equity. New York, New York: Oxford University Press; 2004.

71. Thaddeus S, Maine D. Too far to walk: maternal mortality in context. *Soc Sci Med* 1994; **38**(8): 1091-110.

72. Gabrysch S, Campbell OM. Still too far to walk: literature review of the determinants of delivery service use. *BMC Pregnancy Childbirth* 2009; **9**: 34.

73. Ministry of Public Health (MoPH). National Health Managment Information System Procedures Manual. Islamic Republic of Afghanistan: Ministry of Public Health, 2006.

74. Pinney A. An Afghan Population Estimation. Afghanistan Analysts Network; 2012.

75. Afghanistan Geodesy and Cartography Head Office. Kabul, Afghanistan.

76. ICON-Institute. National Risk and Vulnerability Assessment 2007/8: A profile of Afghanistan. Kabul, Afghanistan, 2008.

77. North Atlantic Treaty Organization Civil Military Fusion Center. CimicWeb. https://www.cimicweb.org (accessed February 15, 2013.

78. Bartlett L, Mawji S, Whitehead S, et al. Where giving birth is a forecast of death: maternal mortality in four districts of Afghanistan, 1999–2002. *Lancet* 2005; **365**(9462): 864-70.

79. GmbH AtSSD. ATLAS.ti v6. Berlin, Germany; 2011.

80. Pope C, Ziebland S, Mays N. Qualitative research in health care. Analysing qualitative data. *BMJ* 2000; **320**(7227): 114-6.

81. Gale N, Heath G, Cameron E, Rashid S, Redwood S. Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology* 2013; **13**(1): 117.

82. Freedman LP, Waldman RJ, de Pinho H, Wirth ME, Chowdhury AM, Rosenfield A. Transforming health systems to improve the lives of women and children. *Lancet* 2005; **365**(9463): 997-1000.

83. Haar RJ, Rubenstein LS. Health in fragile and post-conflict states: a review of current understanding and challenges ahead. *Med Confl Surviv* 2012; **28**(4): 289-316.

84. Studies IIoD. Health in Fragile States. Brighton, United Kingdom: Institute of Development Studies, 2009.

85. Ameli O, Newbrander W. Contracting for health services: effects of utilization and quality on the costs of the Basic Package of Health Services in Afghanistan. *Bull World Health Organ* 2008; **86**(12): 920-8.

86. Loevinsohn B, Sayed GD. Lessons from the health sector in Afghanistan: how progress can be made in challenging circumstances. *JAMA* 2008; **300**(6): 724-6.

87. Palmer N, Strong L, Wali A, Sondorp E. Contracting out health services in fragile states. *BMJ* 2006; **332**(7543): 718-21.

88. Cassels A. Health in Fragile States: An Overview Note. Geneva, Switzerland: WHO, 2005.

89. Petit D, Sondorp E, Mayhew S, Roura M, Roberts B. Implementing a Basic Package of Health Services in post-conflict Liberia: perceptions of key stakeholders. *Soc Sci Med* 2013; **78**: 42-9.

90. USAID. Program Evaluation of the Pre-Service Midwifery Education Program in Afghanistan. Washington DC: United States Agency for International Development, 2010.

91. UNICEF. Afghanistan: Progress of Provinces. Multiple Indicators Cluster Survey 2003. Kabul, Afghanistan: United Nations Children's Fund, 2004.

92. JHSPH. Afghanistan Health Survey 2006: Estimates of Priority Health Indicators for Rural Afghanistan. Kabul, Afghanistan: General Directorate of Policy and Planning, Ministry of Public Health, Islamic Republic of Afghanistan, 2008.

93. Rasooly MH, Govindasamy P, Aqil A, et al. Success in reducing maternal and child mortality in Afghanistan. *Glob Public Health* 2013.

94. World Bank W. Harmonized list of fragile situations, FY14. 2013. http://siteresources.worldbank.org/EXTLICUS/Resources/511777-1269623894864/HarmonizedlistoffragilestatesFY14.pdf (accessed October 15, 2013.

95. UNFPA, UNICEF, WHO, Bank W. Trends in Maternal Mortality: 1990-2010. Geneva, Switzerland: World Health Organization, 2012.

96. World Health Organization (WHO), UNFPA, UNICEF, World Bank W. Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice. Geneva, Switzerland: WHO; 2006.

97. Peters DH, Noor AA, Singh LP, Kakar FK, Hansen PM, Burnham G. A balanced scorecard for health services in Afghanistan. *Bull World Health Organ* 2007; **85**(2): 146-51.

98. Hamilton L. Statistics with Stata: Updated for Version 10. Belmont, CA, USA: Brooks/Cole; 2009.

99. Liang KY, Zeger S. Longitudinal data analysis using generalized linear models. *Biometrika* 1986; **73**(1).

100. McDowell A, Cox NJ. Stata FAQs: Logit transformation. 2004. http://www.stata.com/support/faqs/statistics/logit-transformation/ (accessed October 15, 2013.

101. Cui J. QIC program and model selection in GEE analyses. *The Stata Journal* 2007; **7**(2).

102. Vittinghoff E, Shiboski SC, Glidden DV, McCulloch CE. Regression Methods in Biostatistics: Linear, Logistic, Survival, and Repeated Measures Models. USA: Springer Science+Business Media, Inc.; 2005.

103. Rabe-Hesketh S, Skrondal A. Multilevel and Longitudinal Modeling Using Stata. College Station, TX, USA: Stata Press; 2012.

104. StataCorp. Stata Statistical Software: Release 10. College Station, TX: StataCorp LP; 2007.

105. Gupta N, Maliqi B, Franca A, et al. Human resources for maternal, newborn and child health: from measurement and planning to performance for improved health outcomes. *Hum Resour Health* 2011; **9**(1): 16.

106. Carlson C, de Lamalle JP, Fustukian S, Newell-Jones K, Sibbons M, Sondorp E. Improving the delivery of health and education services in difficult environments: lessons from case studies. London, United Kingdom: DFID Health Systems Resource Center, 2005.

107. Carvalho N, Salehi AS, Goldie SJ. National and sub-national analysis of the health benefits and cost-effectiveness of strategies to reduce maternal mortality in Afghanistan. *Health Policy Plan* 2013; **28**(1): 62-74.

108. Guha-Sapir D, D'Aoust O. Demographic and Health Consequences of Civil Conflict. Washington D.C., USA: World Bank, 2010.

109. Mayhew M, Hansen PM, Peters DH, et al. Determinants of skilled birth attendant utilization in Afghanistan: a cross-sectional study. *Am J Public Health* 2008; **98**(10): 1849-56.

110. Morikawa M. Effects of security threats on primary care access in Logar province, Afghanistan. *Medicine, Conflict and Survival* 2008; **24**(1): 59-64.

111. Sundaram S. Maternal health care service utilization in Afghanistan: barriers to service use: Future Health Systems: Innovations for Equity, 2008.

112. Hanlon M, Burstein R, Masters SH, Zhang R. Exploring the relationship between population density and maternal health coverage. *BMC Health Serv Res* 2012; **12**: 416.

113. APHI/MoPH, CSO, Macro I, IIHMR, WHO/EMRO. Afghanistan Mortality Survey 2010. Calverton, Maryland, USA: APHI/MoPH, CSO, ICF Macro, IIHMR and WHO/EMRO, 2011.

114. United Nations Population Fund (UNFPA), United Nations Children's Fund (UNICEF), World Health Organization (WHO), World Bank W. Trends in Maternal Mortality: 1990-2010. Geneva, Switzerland: WHO, 2012.

115. Nyamtema AS, Urassa DP, van Roosmalen J. Maternal health interventions in resource limited countries: a systematic review of packages, impacts and factors for change. *BMC Pregnancy Childbirth* 2011; **11**: 30.

116. Magadi MA, Agwanda AO, Obare FO. A comparative analysis of the use of maternal health services between teenagers and older mothers in sub-Saharan Africa: evidence from Demographic and Health Surveys (DHS). *Soc Sci Med* 2007; **64**(6): 1311-25.

117. Jat TR, Ng N, San Sebastian M. Factors affecting the use of maternal health services in Madhya Pradesh state of India: a multilevel analysis. *Int J Equity Health* 2011; **10**(1): 59.

118. Ndao-Brumblay SK, Mbaruku G, Kruk ME. Parity and institutional delivery in rural Tanzania: a multilevel analysis and policy implications. *Health Policy Plan* 2013; **28**(6): 647-57.

119. Singh PK, Kumar C, Rai RK, Singh L. Factors associated with maternal healthcare services utilization in nine high focus states in India: a multilevel analysis based on 14 385 communities in 292 districts. *Health Policy Plan* 2013.

120. Babalola S, Fatusi A. Determinants of use of maternal health services in Nigeria--looking beyond individual and household factors. *BMC Pregnancy Childbirth* 2009; **9**: 43.

121. Kyei NN, Campbell OM, Gabrysch S. The influence of distance and level of service provision on antenatal care use in rural Zambia. *PLoS One* 2012; **7**(10): e46475.

122. Masters SH, Burstein R, Amofah G, Abaogye P, Kumar S, Hanlon M. Travel time to maternity care and its effect on utilization in rural Ghana: a multilevel analysis. *Soc Sci Med* 2013; **93**: 147-54.

123. Viswanathan K, Becker S, Hansen PM, et al. Infant and under-five mortality in Afghanistan: current estimates and limitations. *Bull World Health Organ* 2010; **88**(8): 576-83.

124. MoPH. A Basic Package of Health Services. Islamic Republic of Afghanistan: Ministry of Public Health, 2009.

125. MoPH. Essential Package of Health Services. Kabul: Ministry of Public Health, 2007.

126. Waldman R, Strong L, Wali A. Afghanistan's Health System Since 2001: Condition Improved, Prognosis Cautiously Optimistic. Kabul: Afghanistan Research and Evaluation Unit (AREU), 2006.

127. Siddiqi S, Masud T, Sabri B. Contracting but not without caution: experience with outsourcing of health services in countries of the Eastern Mediterranean Region. . *Bulletin of World Health Organization* 2006; **84**(11): 867-75.

128. Arur A. Contracting for health services in Afghanistan: an analysis of the changes in outpatient services utilization and quality between 2004 and 2005. Baltimore: Johns Hopkins University (PhD dissertation, Department of International Health), 2008.

129. United Nations Children's Fund (UNICEF). Innovative Approaches to Maternal and Newborn Health: Compendium of Case Studies. Geneva, Switzerland: UNICEF Health Section, Program Division, 2013.

130. Ministry of Public Health (MoPH). Final Report on Pilot Study Increasing Demand for Utilization of Maternal Health and Child Care Services. Kabul, Afghanistan: Minsitry of Public Health, 2011.

131. Johns Hopkins Bloomberg School of Public Health (JHSPH), Indian Institute of Health Management Research (IIHMR). Results-Based Financing Project in Afghanistan Baseline Household Survey Report. 2011.

132. Ministry of Public Health (MoPH). National Reproductive Health Policy, 2012-2016. Islamic Republic of Afghanistan: Ministry of Public Health, 2012.

133. Rockers PC, Wilson ML, Mbaruku G, Kruk ME. Source of antenatal care influences facility delivery in rural Tanzania: a population-based study. *Matern Child Health J* 2009; **13**(6): 879-85.

134. Pervin J, Moran A, Rahman M, et al. Association of antenatal care with facility delivery and perinatal survival - a population-based study in Bangladesh. *BMC Pregnancy Childbirth* 2012; **12**: 111.

135. Carroli G, Rooney C, Villar J. How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence. *Paediatr Perinat Epidemiol* 2001; **15 Suppl 1**: 1-42.

136. Ronsmans C, Graham WJ. Maternal mortality: who, when, where, and why. *The Lancet* 2006; **368**(9542): 1189-200.

137. Lassi ZS, Haider BA, Bhutta ZA. Community-based intervention packages for reducing maternal and neonatal morbidity and mortality and improving neonatal outcomes. *Cochrane Database Syst Rev* 2010; (11): CD007754.

138. Montagu D, Yamey G, Visconti A, Harding A, Yoong J. Where do poor women in developing countries give birth? A multi-country analysis of demographic and health survey data. *PLoS One* 2011; **6**(2): e17155.

139. Kruk ME, Paczkowski M, Mbaruku G, de Pinho H, Galea S. Women's preferences for place of delivery in rural Tanzania: a population-based discrete choice experiment. *Am J Public Health* 2009; **99**(9): 1666-72.

140. Hulton LA, Matthews Z, Stones RW. Applying a framework for assessing the quality of maternal health services in urban India. *Soc Sci Med* 2007; **64**(10): 2083-95.

141. Kumbani L, Bjune G, Chirwa E, Malata A, Odland JO. Why some women fail to give birth at health facilities: a qualitative study of women's perceptions of perinatal care from rural Southern Malawi. *Reprod Health* 2013; **10**: 9.

142. Karkee R, Binns CW, Lee AH. Determinants of facility delivery after implementation of safer mother programme in Nepal: a prospective cohort study. *BMC Pregnancy Childbirth* 2013; **13**(1): 193.

143. Ministry of Public Health (MoPH). Reproductive Health Policy. Kabul, Afghanistan: Ministry of Public Health, Islamic Republic of Afghanistan, 2006.

144. Turkmani S, Currie S, Mungia J, et al. 'Midwives are the backbone of our health system': Lessons from Afghanistan to guide expansion of midwifery in challenging settings. *Midwifery* 2013; **29**(10): 1166-72.

145. Akin JS, Hutchinson P. Health-care facility choice and the phenomenon of bypassing. *Health Policy Plan* 1999; **14**(2): 135-51.

146. Karkee R, Lee AH, Binns CW. Bypassing birth centres for childbirth: an analysis of data from a community-based prospective cohort study in Nepal. *Health Policy Plan* 2013.

147. Karkee R, Lee AH, Pokharel PK. Women's perception of quality of maternity services: a longitudinal survey in Nepal. *BMC Pregnancy Childbirth* 2014; **14**(1): 45.

148. Kruk ME, Mbaruku G, McCord CW, Moran M, Rockers PC, Galea S. Bypassing primary care facilities for childbirth: a population-based study in rural Tanzania. *Health Policy Plan* 2009; **24**(4): 279-88.

149. Olsen OE, Ndeki S, Norheim OF. Human resources for emergency obstetric care in northern Tanzania: distribution of quantity or quality? *Hum Resour Health* 2005; **3**: 5.

150. Tsegay Y, Gebrehiwot T, Goicolea I, Edin K, Lemma H, Sebastian MS. Determinants of antenatal and delivery care utilization in Tigray region, Ethiopia: a cross-sectional study. *Int J Equity Health* 2013; **12**: 30.

151. Molina HF, Nakamura K, Kizuki M, Seino K. Reduction in inequality in antenatal-care use and persistence of inequality in skilled birth attendance in the Philippines from 1993 to 2008. *BMJ Open* 2013; **3**(6).

152. Bailey PE, Keyes EB, Parker C, Abdullah M, Kebede H, Freedman L. Using a GIS to model interventions to strengthen the emergency referral system for maternal and newborn health in Ethiopia. *Int J Gynaecol Obstet* 2011; **115**(3): 300-9.

153. Tatem AJ, Campbell J, Guerra-Arias M, de Bernis L, Moran A, Matthews Z. Mapping for maternal and newborn health: the distributions of women of childbearing age, pregnancies and births. *Int J Health Geogr* 2014; **13**(1): 2.

154. Gabrysch S, Cousens S, Cox J, Campbell OM. The influence of distance and level of care on delivery place in rural Zambia: a study of linked national data in a geographic information system. *PLoS Med* 2011; **8**(1): e1000394.

155. Edmonds JK, Paul M, Sibley L. Determinants of place of birth decisions in uncomplicated childbirth in Bangladesh: an empirical study. *Midwifery* 2012; **28**(5): 554-60.

156. Bowser D, Hill K. Exploring Evidencec for Disrespect and Abuse in Facility-Based Childbirth: Report of A Landscape Analysis. Washington DC, USA: USAID TRAction Project, Harvard School of Public Health, University Research Co., 2010.

157. Warren C, Njuki R, Abuya T, et al. Study protocol for promoting respectful maternity care initiative to assess, measure and design interventions to reduce disrespect and abuse during childbirth in Kenya. *BMC Pregnancy and Childbirth* 2013; **13**(1): 21.

158. D'Ambruoso L, Abbey M, Hussein J. Please understand when I cry out in pain: women's accounts of maternity services during labour and delivery in Ghana. *BMC Public Health* 2005; **5**: 140.

159. Mpembeni RN, Killewo JZ, Leshabari MT, et al. Use pattern of maternal health services and determinants of skilled care during delivery in Southern Tanzania: implications for achievement of MDG-5 targets. *BMC Pregnancy Childbirth* 2007; **7**: 29.

160. Rahman A, Moran A, Pervin J, et al. Effectiveness of an integrated approach to reduce perinatal mortality: recent experiences from Matlab, Bangladesh. *BMC Public Health* 2011; **11**: 914.

161. Mullany BC, Becker S, Hindin MJ. The impact of including husbands in antenatal health education services on maternal health practices in urban Nepal: results from a randomized controlled trial. *Health Educ Res* 2007; **22**(2): 166-76.

162. Agha S, Carton TW. Determinants of institutional delivery in rural Jhang, Pakistan. *Int J Equity Health* 2011; **10**: 31.

163. Danforth EJ, Kruk ME, Rockers PC, Mbaruku G, Galea S. Household decision-making about delivery in health facilities: evidence from Tanzania. *J Health Popul Nutr* 2009; **27**(5): 696-703.

164. Thapa DK, Niehof A. Women's autonomy and husbands' involvement in maternal health care in Nepal. *Soc Sci Med* 2013; **93**: 1-10.

165. Ministry of Public Health (MoPH). National Reproductive Health Strategy, 2012-2016. Kabul, Afghanistan: Ministry of Public Health, 2012.

166. Ghobarah HA, Huth P, Russett B. The post-war public health effects of civil conflict. *Soc Sci Med* 2004; **59**(4): 869-84.

167. Penn-Kekana L, McPake B, Parkhurst J. Improving Maternal Health: Getting What Works To Happen. *Reprod Health Matters* 2007; **15**(30): 28-37.

168. UNICEF. Best Estimates of Social Indicators for Children (1999-2005). New York: United Nations Children's Fund, 2006.

169. Bartlett LA, Mawji S, Whitehead S, et al. Where giving birth is a forecast of death: maternal mortality in four districts of Afghanistan, 1999–2002. *Lancet* 2005; **365**(9462): 864-70.

170. Bartlett L, Lefevre A, Tappis H, et al. Reproductive Age Mortality Study II: Maternal Mortality in Afghanistan (preliminary report). Baltimore, MD: Johns Hopkins Bloomberg School of Public Health; 2013.

171. Trani JF, Bakhshi P, Noor AA, Lopez D, Mashkoor A. Poverty, vulnerability, and provision of healthcare in Afghanistan. *Soc Sci Med* 2010; **70**(11): 1745-55.

172. Byrne A, Hodge A, Jimenez-Soto E, Morgan A. What works? Strategies to increase reproductive, maternal and child health in difficult to access mountainous locations: a systematic literature review. *PLoS One* 2014; **9**(2): e87683.

173. Hulton L, Dariang M, Shakya G. Essential Health Care Services Capacity Assessment for Health Systems Strengthening. Kathmandu, Nepal: Nepal Health Sector Support Program, 2010.

174. Johns B, Steinhardt L, Walker DG, Peters DH, Bishai D. Horizontal equity and efficiency at primary health care facilities in rural Afghanistan: a seemingly unrelated regression approach. *Soc Sci Med* 2013; **89**: 25-31.

175. McCaw-Binns AM, Ashley DE, Knight LP, MacGillivray I, Golding J. Strategies to prevent eclampsia in a developing country: I. Reorganization of maternity services. *Int J Gynaecol Obstet* 2004; **87**(3): 286-94.

176. Soubeiga D, Sia D, Gauvin L. Increasing institutional deliveries among antenatal clients: effect of birth preparedness counselling. *Health Policy Plan* 2014.

177. Yuster EA. Rethinking the role of the risk approach and antenatal care in maternal mortality reduction. *International Journal of Gynecology & Obstetrics* 1995; **50, Supplement 2**(0): S59-S61.

178. Afghanistan Public Health Institute (APHI/MoPH), Central Statistics Office (CSO), ICF Macro, Indian Institute of Health Management Research (IIHMR), World Health Organization Eastern Meditterranean Regional Office (WHO/EMRO). Afghanistan Mortality Survey 2010. Calverton, Maryland, USA: APHI/MoPH, CSO, ICF Macro, IIHMR and WHO/EMRO, 2011.

179. Prata N, Sreenivas A, Greig F, Walsh J, Potts M. Setting priorities for safe motherhood interventions in resource-scarce settings. *Health Policy* 2010; **94**(1): 1-13.

180. Prata N, Passano P, Rowen T, Bell S, Walsh J, Potts M. Where There Are (Few) Skilled Birth Attendants. *J Health Popul Nutr* 2011; **29**(2): 11.

181. Sanghvi H, Ansari N, Prata NJ, Gibson H, Ehsan AT, Smith JM. Prevention of postpartum hemorrhage at home birth in Afghanistan. *Int J Gynaecol Obstet* 2010; **108**(3): 276-81.

182. Rajbhandari S, Hodgins S, Sanghvi H, et al. Expanding uterotonic protection following childbirth through community-based distribution of misoprostol: operations research study in Nepal. *Int J Gynaecol Obstet* 2010; **108**(3): 282-8.

183. Sibley LM, Spangler SA, Barry D, Tesfaye S, Desta BF, Gobezayehu AG. A Regional Comparison of Distribution Strategies and Women's Awareness, Receipt, and Use of Misoprostol to Prevent Postpartum Hemorrhage in Rural Amhara and Oromiya Regions of Ethiopia. *J Midwifery Womens Health* 2014; **59 Suppl 1**: S73-82.

184. World Health Organization (WHO). WHO Recommendations for Optimizing Health Workers' Roles to Improve Access to Key Maternal and Newborn Health Interventions Through Task Shifting. Geneva, Switzerland: World Health Organization, 2012.

185. World Health Organization (WHO). WHO Recommendations for the Prevention and Treatment of Postpartum Hemmorhage. Geneva, Switzerland: World Health Organization, 2012.

186. MacGillivray I, McCaw-Binns AM, Ashley DE, Fedrick A, Golding J. Strategies to prevent eclampsia in a developing country: II. Use of a maternal pictorial card. *Int J Gynaecol Obstet* 2004; **87**(3): 295-300.

187. Head SK, Yount KM, Sibley LM. Delays in recognition of and care-seeking response to prolonged labor in Bangladesh. *Soc Sci Med* 2011; **72**(7): 1157-68.

188. Quayyum Z, Khan MN, Quayyum T, Nasreen HE, Chowdhury M, Ensor T. "Can community level interventions have an impact on equity and utilization of maternal health care" - evidence from rural Bangladesh. *Int J Equity Health* 2013; **12**: 22.

189. Mselle LT, Moland KM, Mvungi A, Evjen-Olsen B, Kohi TW. Why give birth in health facility? Users' and providers' accounts of poor quality of birth care in Tanzania. *BMC Health Serv Res* 2013; **13**(174): 174.

190. DRC. Humanitarian Needs Assessment and Engagement Strategy in Kandahar Province, Afghanistan. Kabul, Afghanistan, 2013.

191. Witter S. Health financing in fragile and post-conflict states: what do we know and what are the gaps? *Soc Sci Med* 2012; **75**(12): 2370-7.

192. JHSPH, IIHMR. Afghansitan Health Survey 2012 (Draft Report). Kabul, Afghanistan, 2013.

193. Gabrysch S, Zanger P, Campbell OM. Emergency obstetric care availability: a critical assessment of the current indicator. *Trop Med Int Health* 2012; **17**(1): 2-8.

194. Gabrysch S, Zanger P, Seneviratne HR, Mbewe R, Campbell OM. Tracking progress towards safe motherhood: meeting the benchmark yet missing the goal? An appeal for better use of health-system output indicators with evidence from Zambia and Sri Lanka. *Trop Med Int Health* 2011; **16**(5): 627-39.

195. Comission on informaiton and accountability for Women's and Children's Health. Keeping promises, measuring results. New York, New York, 2011.

196. van der Haar G, Heijmans A, Hilhorst D. Interactive research and the construction of knowledge in conflict-affected settings. *Disasters* 2013; **37 Suppl 1**: S20-35.

197. Fujita N, Zwi AB, Nagai M, Akashi H. A comprehensive framework for human resources for health system development in fragile and post-conflict states. *PLoS Med* 2011; **8**(12): e1001146.

198. Ministry of Public Health (MoPH). Health for All Afghans National Priority Program. Kabul, Afghanistan: Ministry of Public Health, 2012.

199. Ministry of Public Health (MoPH). A Basic Package of Health Services. Islamic Republic of Afghanistan: Ministry of Public Health, 2010.

200. Michael M, Pavignani E, Hill PS. Too good to be true? An assessment of health system progress in Afghanistan, 2002–2012. *Medicine, Conflict and Survival* 2013: 1-24.

201. United Nations Assistance Mission in Afghanistan (UNAMA), United Nations Office of the High Commissioner for Human Rights (UNOCHR). Protection of Civilians in Armed Conflict: Afghanistan Annual Report 2013. Kabul, Afghanistan: United Nations Assistance Mission in Afghanistan, 2014.

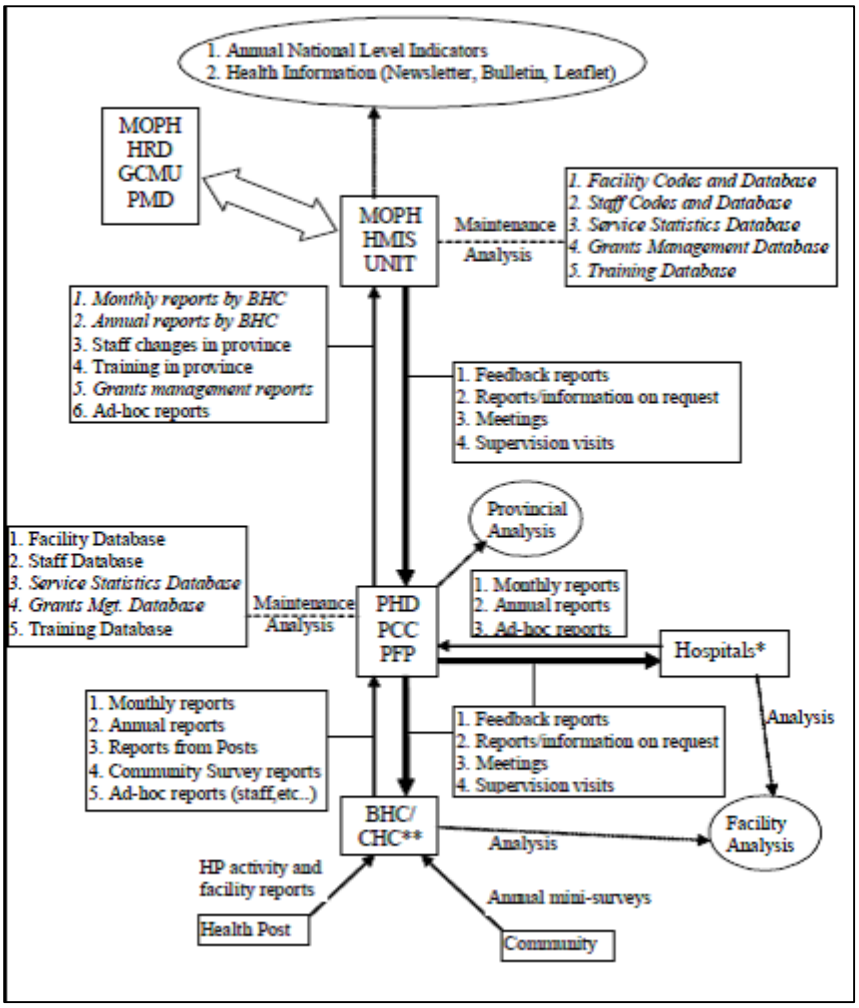
202. Bornemisza O, Ranson MK, Poletti TM, Sondorp E. Promoting health equity in conflict-affected fragile states. *Soc Sci Med* 2010; **70**(1): 80-8.

203. Leonard KL. Active patients in rural African health care: implications for research and policy. *Health Policy Plan* 2014; **29**(1): 85-95.

204. Hill K. Gains in Afghan Health: Too Good To Be True? Center for Global Development Brownbag, June 4, 2012. Washington DC; 2012.

Annex A

Health Management Information System Flow



Annex B

BPHS Balanced Scorecard Sampling, Data Collection and Analysis Processes

Sampling

The National Health Services Performance Assessment (NHSPA) is conducted each year using a stratified random sample of all health facilities providing the BPHS and systematic random samples of patients and health workers.

The 2006-2007 NHSPA did not include Kandahar, Helmand, Zabul and Uruzgan provinces because security conditions prohibited assessment teams from reaching facilities. In 2008, Farah province was also excluded due to insecurity. In 2009/10 the NHSPA included all 34 provinces but alternative methods of data collection were used in insecure and inaccessible areas (local school teachers were trained on a concise version of the NHSPA data collection instruments).

A sampling frame of BPHS health facilities was created for each province by compiling a list of health facilities from Ministry of Public Health in Kabul and updating them with the Provincial Public Health Director, Provincial Health Management Information Systems Officer and key informants from NGOs in each province and stratifying them into groups by facility type. For each province, facilities were then randomly selected from each stratum according to the following distribution by facility type: 15 basic health centers, 7 comprehensive health centers, and the outpatient departments of three District Hospitals. (This stratified sample was used for NHSPA in 2006-2008. In 2009/10, hospitals were removed from the BPHS Balanced Scorecard sample, and 5 sub-centers included instead.) If fewer than the above number of a particular facility type existed in each province, other facility types were substituted. A summary of the national sample for NHSPA 2006-2009/10 is presented in **Supplementary Table B1.**

Supplementary Table B1: NHSPA Sample, 2006 – 2009/10

Unit	2006	2007	2008	2009/10
Number of provinces	30	30	29	34
Number of facilities	630	636	618	726
Number of observations of patient-provider interactions	5964	6089	5970	7979
Number of exit interviews	5964	6087	5950	7979
Number of health workers interviewed	1723	1940	2233	2281

The sampling scheme for patients was determined after the research team arrived at a health facility. Sampling patterns selected after the expected number of new outpatients for the day was estimated by the Clinician in-Charge of the facility are presented in **Supplementary Table B2.**

Supplementary Table B2: NHSPA BPHS Patient Sampling Patterns

Expected # of new patients in age stratum	Sampling pattern
If less than 10 patients in each age stratum are expected per day	Select each eligible patient until 5 observations of consultations involving patients in that age stratum have been completed
If 11-15 patients in each age stratum are expected per day	Select every second eligible patient until 5 observations of consultations involving patients in that age stratum have been completed
If 16-20 patients in each age stratum are expected per day	Select every third eligible patient until 5 observations of consultations involving patients in that age stratum have been completed
If more than 20 patients in each age stratum are expected per day	Select every fourth eligible patient until 5 observations of consultations involving patients in that age stratum have been completed

Data collection

The following instruments were developed for collecting data from health facilities and communities for the Balanced Scorecard:

- F1: observations of patient-provider interactions involving patients under 5 years of age
- F2: observations of patient provider interactions involving patients 5 years of age and older
- F3: exit interviews with caretakers of patients under 5 years of age
- F4: exit interviews with patients 5 years of age and older or their caretakers
- F5: HW interviews for facility based health workers
- F6: community health worker interviews
- F7: facility assessment form
- C1: household survey

From 2004 through 2008, NHSPA data collection was conducted during the summer months (July through September) in all parts of the country. In 2009/10, a new system of year-round data collection was introduced to allow the same data collection teams to visit multiple provinces and to reduce bias that may be created if BPHS implementers know that the assessment team will visit during a certain part of the year.

In order to ensure high quality data collected from facilities, a number of data collection monitoring and supervision mechanisms were put into place. Field monitors accompanied each survey team in the first five facilities where data was collected and conducted simultaneous data with the team. If any significant differences between the monitor and team's data was found, the survey team would be requested to re-collect forms with marked discrepancy. In addition, after survey teams submitted all completed data collection forms to the Johns Hopkins Kabul office, five health facilities were selected at random and field monitors deployed to verify the data collected. Following field level verification, data editors reviewed all forms for errors.

Data was double-entered in a CSPro database by trained entry operators. The two datasets were then compared and any inconsistency between the two datasets resolved by looking at the original paper forms to create a final dataset.

Data Analysis

Mean scores for each BPHS performance indicator were calculated for each health facility type present for each province. These scores were then weighted by multiplying the score by the standardized distribution of facility type or health worker type, depending on the domain and indicator (i.e. indicators in Domain B – Staffing were weighted according to distribution of health worker type while all others were weighted according to facility type), and a weighted mean score calculated for each province.

A Monitoring and Evaluation Advisory Board, along with the Johns Hopkins Bloomberg School of Public Health (JHSPH) and Indian Institute of Health Management Research (IIHMR) team, conducted a sensitivity analysis to determine whether the overall results are sensitive to the weighting given to each indicator on the scorecard. The Ministry of Public Health, the Monitoring and Evaluation Advisory Board and the JHU/IIHMR team concluded that all indicators on the scorecard should be given equal weighting for two reasons: 1) the composite score assigned to each province was found to have a low sensitivity to changes in the weighting schemes applied to the indicators on the scorecard (that is to say, the composite scores did not change very much when different weighting schemes were applied); and 2) developing a differential weighting

scheme involves a great deal of subjectivity and different individuals were found to have different opinions regarding which indicators should be given what weights.

Supplementary Table B3: NHSPA BPHS Balanced Scorecard Indicators

BPHS performance indicators	Description/Definition
Patients and Community	
Overall patient satisfaction	Captures viewpoint of patients and community on a four-point Likert scale
Patient perception of quality index	Index of 9 sub-items, each measured on a four-point Likert scale
Written shura-e-sehie activities	Measures the level of community involvement in management of the health facility, assuming that existence of a written document at the health facility is associated with an active village health committee (shura-e-sehie)
Staff	
Health worker satisfaction index	Index of 19 sub-items covering a variety of topics including working relationships, access to medicines and equipment, employee benefits and opportunities and ability to meet the needs of the community
Salary payments current	Measures the proportion of health workers who received their salary within the month before the survey
Capacity for Service Provision	
Equipment functionality index	Index of 14 subgroup items covering a variety of equipment deemed essential to any BPHS facility
Drug availability index	Index of 5 essential medications (ophthalmic tetracycline, paracetamol, amoxicillin, ORS)
Family planning availability index	Index based on presence of FP commodities (condoms, oral contraceptive pills, DMPAs and IUDs)
Laboratory functionality index	Index of 11 tests essential to diagnose diseases and conditions with significant burdens in Afghanistan (only measured at CHCs b/c lower facilities are not intended to have labs)
Staffing index	Meets requirements (y/n), which differ by facility level
Provider knowledge score	Assessed knowledge of health workers using questions and scenarios in 3 modules (immunization, IMCI, RH) – comparable for 2006-2008, revised in 2009/10
Training in past year	Index of 39 subgroups in 2006-2008, revised to 6 subgroups in 2009/10
HMIS use index	Index of 3 subgroups: Facility capacity to generate MIAR< FSR and notifiable disease reports
Clinical guidelines index	Index measuring presence of clinical guidelines in 9 medical areas
Infrastructure index	Index of 6 subgroup measures: registration room, ER, minor surgery theater, pharmacy, on-call room (4 at BHC, not surgery theater or waiting room)
Patient record index	Three subgroups: health worker completes individual patient record, patient tally sheet, register book
TB register index	Binary (y/n has register)
Service Provision	
Patient history and physical exam index	Index of 7 sub-items: basic steps to proper history and physical exam (ask for patient age, greets patient, asks nature of complaint, asks duration of primary compliant, asks about previous treatments, examines some part of the patient and ensures patient's privacy.
Patient counseling index	Index of 9 sub-items related to counseling patients: provides name of disease, explains disease, explains precautions or home care, provides name of medicine, explains how to take medicine, explains adverse reactions, details signs and symptoms to prompt return, advises when to return, asks if patient has any questions
Proper sharps disposal	Binary (y/n for proper disposal)

Average new outpatient visits per month	Proportion of BHC where the new outpatient visits per months exceeds a cut-off of one standard deviation above the national mean.
Time spent with patient	Greater than 9 minutes (estimated min time to complete a history, physical examination, diagnosis and counseling for a child with common complaints faced in an outpatient setting
BPHS facilities providing ANC	% of BHC & CHC providing ANC to patients
Provision of delivery care	2006-2008 = index of 4 subgroups: provide normal delivery services, able to cross-match blood, having a partograph to monitor labor, provide cesarean sections (DH); 2009/10 only first 3 subgroups
Financial Systems	
Facilities with user fee guidelines	2006-2007, MoPH discontinued user fees in 2008 so not measured
Facilities with exemptions for poor patients	2006-2007, MoPH discontinued user fees in 2008 so not measured
Overall vision (equity, pro-poor, pro-women)	
Females as percent of new outpatients	Measures the percentage of new outpatients that were female in the month proceeding the assessment
Outpatient visit concentration index	Score of 50 indicates equal utilization by all wealth groups, higher numbers indicate higher rates of utilization by poorer groups and lower indicates higher rates of utilization by wealthier groups (scale -1 to 1 from 2006-2008)
Patient satisfaction concentration index	Score of 50 indicates equal satisfaction with services among poor and non-poor patient populations, higher numbers indicate greater satisfaction among poorer groups and lower indicated greater satisfaction among wealthier groups (scale -1 to 1 from 2006-2008)

Annex C

List of published and unpublished documents reviewed for RAMOS II study

National, policies and protocols

The following documents were obtained from the Ministry of Public Health Directorate of Policy & Planning:

2003 Basic Package of Health Services
2003 Reproductive Health Strategy
2003 Antenatal Care Guidelines
2003 Family Planning Guidelines
2003 Newborn Care Guidelines
2003 Postpartum Care Guidelines
2003 National Medicine Policy
2004 Hospital Policy
2004 Intrapartum Emergency Obstetric Care Standards
2005 Basic Package of Health Services
2005 National Policy on Midwifery Education and Accreditation
2005 Home Birth Guidelines
2005 National Health Policy
2006 Hospital Standards
2006 Human Resources Policy
2006 Health Management Information System Procedures Manual
2006 Reproductive Health Strategy
2006 Family Planning Strategy
2006 WHO Country Cooperation Strategy
2007 Health and Nutrition Sector Strategy
2007 Gender Equity Strategy
2007 Healthcare Financing and Sustainability Strategy
2007 Service Delivery and Governance at the Sub-National Level in Afghanistan
2008 Public Health Law
2008 Guidance for Scaling Up Maternal, Newborn and Child Health at the Community Level
2008 Human Resource Development Plan for Reproductive Health
2008 National Health Strategy
2009 Health Care Financing Strategy
2009 Child and Adolescent Health Strategy
2009 Comprehensive Health Information System Strategic Plan
2009 Public Nutrition Policy and Strategy
2010 Basic Package of Health Services
2010 Policy for Midwifery Education
2010 Community Midwifery Education Curriculum
2011 Ministry of Public Health Strategic Plan
2011 Reproductive Health Policy
2011 Reproductive Health Policy
2011 Policy and Strategy for Nursing and Midwifery Services
2011 Quality Improvement Strategy
2012 Health for All Afghans National Priority Program
2012 National Gender Strategy
2012 Human Resources for Health Plan

Provincial, district and community-level program documents

The following documents were obtained from donor agencies and NGOs working in study areas:
2000 IbnSina Reproductive Health Survey
2002 IbnSina Evaluation of Primary Health Care Programs
2006 Rural Expansion of Afghanistan's Community-based Healthcare Program Report
2007 National Area Based Development Program District Development Plans
2009 Evaluation of Performance Based Partnership Grants Project in Afghanistan
2009 Mid-Term Evaluation of the USAID Tech Serve Program
2009 MedAir Performance Based Partnership Grant Program Final Project Report
2010 Afghanistan Medicine Use Study
2011 National Solidarity Program Implemented Subprojects List
2011 Concern Worldwide Cash for Work Drought Response Case Study
2011 Family Health House and Mobile Health Team Mapping
2011 Concern Worldwide Program Reports
2011 MedAir Program Reports
2011 Swedish Committee for Afghanistan Program Reports
2012 ACF, Solidarites & MedAir Emergency Rapid Assessment Report

Routine health service data

The following data was extracted from the national Health Management Information System:
Number of midwives employed per facility per year
Number of new antenatal visits per facility per year
Number of normal deliveries per facility per year
Number of assisted deliveries per facility per year
Number of deliveries with major complications per facility per year
Number of deliveries with other complications per facility per year
Number of live births per facility per year
Number of still births per facility per year
Number of major obstetric complications referred out per facility per year
Number of other obstetric complications referred out per facility per year
Number of maternal deaths from major complications per facility per year
Number of maternal deaths from other complications per facility per year
Number of neonatal complications per facility per year
Number of low birth weight cases per facility per year
Number of neonatal deaths per facility per year

Assessment Reports

The following reports were provided by donor agencies or publically available online:
2000 Afghanistan Multiple Indicator Cluster Survey
2000 Safe Motherhood Initiative Assessment Findings
2002 National Health Resources Assessment
2002 Assessment of Services and Human Resource Needs for the Development of the Safe Motherhood Initiative in Afghanistan
2003 Reproductive Health Resources Assessment
2003 Central Statistics Office District Profiles
2003 UNHCR District Profiles
2004 Afghanistan Health Sector Balanced Scorecard Report
2005 Afghanistan Health Sector Balanced Scorecard Report
2005 Report from Multicolor Evaluation of Emergency and Reconstruction Assistance from Denmark, Ireland, the Netherlands, Sweden and the United Kingdom
2006 Regional Rural Economic Regeneration Program Provincial Profiles

2006 Afghanistan Health Sector Balanced Scorecard Report
2006 Afghanistan Health Survey
2006 WHO Afghanistan Mission Report
2007 Afghanistan Health Sector Balanced Scorecard Report
2007 Afghanistan Provincial Hospital Assessment Report
2007 Afghanistan Health Information System Review and Assessment
2007 GAVI Alliance Health System Strengthening Program Funding Application
2007 Drug Quality Assessment Study
2007/08 National Risk and Vulnerability Assessment
2008 Program for Culture & Conflict Studies Provincial Profiles
2008 Afghanistan Health Sector Balanced Scorecard Report
2008 Afghanistan Health Indicators Fact Sheet
2008 Balanced Scorecard Report for Provincial and Kabul Hospitals
2008 Strategic Assessment of Family Planning in Afghanistan
2008/09 National Health Accounts Report
2008 Final Evaluation Report on Health Financing Pilots: The Effects of User Fees vs. Free Services for Primary Care in Afghanistan
2008/09 Afghanistan National Development Strategy Annual Report
2009 Afghanistan Private Sector Health Survey
2009 Program Evaluation of the Pre-Service Midwifery Education Program in Afghanistan
2009/10 Afghanistan Health Sector Balanced Scorecard
2009/10 Balanced Scorecard Report for Afghanistan Hospitals
2011 World Bank Provincial Briefs
2011 USAID Provincial Briefs
2011 UN Who is Doing What Where Reports
2011 Afghanistan Multiple Indicator Cluster Survey Report
2012 State of Telecommunications and Internet in Afghanistan

Annex D

Exploratory factor analysis conducted to develop alternative measures for health system performance components in Paper 1

Supplementary Table D1: Kaiser-Meyer Olkin test of sampling adequacy for exploratory factor analysis of health system performance domain indicators

Variables	KMO
Domain A: Patient and Community Perspectives (patient satisfaction, patient perception of quality, village health council activity)	0.4903
Domain B: Staff Perspectives (current salary payment, health worker satisfaction	0.5000
Domain C: Service Provision Capacity (infrastructure, equipment, drug availability, family planning, laboratory functionality, required staffing, training, provider knowledge, clinical guidelines, HMIS use, patient record index, TB register)	0.7099
Domain D: Service Provision (patient history and physical exam, patient counseling, proper sharps disposal, ANC provision)	0.4966
Domain A+B: Patient, Community and Staff Perspectives (patient satisfaction, patient perception of quality, village health council activity, current salary payment, health worker satisfaction)	0.6308
Domain C+D: Service Provision (infrastructure, equipment, drug availability, family planning, laboratory functionality, required staffing, training, provider knowledge, clinical guidelines, HMIS use, patient record index, TB register, patient history and physical exam, patient counseling, proper sharps disposal, ANC provision)	0.7279

Supplementary Table D2: Exploratory factor analysis using principal component factors and orthogonal Varimax rotation to develop a scale for service provision in Afghanistan

ROTATED FACTOR LOADINGS (PATTERN MATRIX) AND UNIQUE VARIANCES					
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Uniqueness**
Infrastructure index	0.0743	0.1492	0.0354	0.7898	0.3473
Equipment functionality	0.5313	0.5265	0.1249	0.3587	0.2962
Drug availability index	-0.0069	0.1284	0.4014	-0.6148	0.0444
Family planning index score	0.7115	0.1085	0.1099	-0.1588	0.4448
Laboratory functionality	0.6837	0.0476	0.1624	0.2426	0.445
Required staffing score	0.4031	0.1120	-0.3997	0.5926	0.3141
Training index score	0.2453	0.0575	0.6089	0.119	0.5516
Provider knowledge score	0.2172	0.3356	0.3713	0.2463	0.6417
Clinical guidelines index	0.569	0.6144	0.172	0.2898	0.1852
HMIS use index	0.1579	0.8004	0.2168	0.0685	0.2828
Patient record index	0.127	0.0662	0.6991	-0.2038	0.4492
TB register	0.5119	0.2274	0.045	0.0732	0.6789
Patient history and physical exam index	-0.2478	0.4397	0.6546	0.1388	0.2974
Patient counseling	0.0298	0.3774	0.7079	0.062	0.3517
Proper sharps disposal	0.057	0.7557	0.0338	0.0065	0.4246
ANC provision	0.8078	0.0188	-0.0867	0.0807	0.3331
PRINCIPAL COMPONENT FACTOR CHARACTERISTICS					
Number of items in scale	4	4	6	2	
Variance (Eigenvalue)	2.87637	2.43974	2.39044	1.80558	
Difference	0.43663	0.0493	0.58485	.	
Proportion	0.1798	0.1525	0.1494	0.1128	
Cumulative	0.1798	0.3323	0.4817	0.5945	
Cronbach's alpha	0.6332	0.7372	0.6852	0.5212	

LR test: independent. vs. saturated: chi2(120) = 713.74 Prob>chi2 = 0.000

Kaiser-Meyer-Olkin test of sampling adequacy: 0.7279

Supplementary Table D3: Linear regression analysis of relationship between skilled birth attendance and health system performance (measured using individual indicator and factor scores) in Afghanistan, 2006 – 2009/10

	BIVARIATE POPULATION AVERAGE MODEL*				MULTIVARIATE POPULATION AVERAGE MODEL**			
	Unadjusted Coeff. (95% CI)*	**Semi-robust SE**	**P-value**		**Adjusted Coeff. (95% CI)***	**Semi-robust SE**	**P-value**	
Overall patient satisfaction	-0.14 (-0.37, 0.08)	0.11	0.219		-----	-----	-----	
Patient perception of quality	0.03 (-0.31, 0.36)	0.17	0.875		-----	-----	-----	
Village health council activity	0.15 (0.05, 0.24)	0.05	**0.002**		0.05 (-0.08, 0.18)	0.07	0.483	
Health worker satisfaction	0.05 (-0.22, 0.31)	0.14	0.729		-----	-----	-----	
Current salary payment	0.02 (-0.04, 0.08)	0.03	0.487		-----	-----	-----	
Service provision score	3.80 (1.94, 5.65)	0.95	**<0.001**		3.59 (1.87, 5.31)	0.88	**<0.001**	
ln(Facilities per 100,000 pop)	11.62 (1.40,- 21.84)	5.21	**0.026**		12.23 (0.87, 23.6)	5.8	**0.035**	
Facilities per 1000km	0.43 (0.06, 0.79)	0.19	**0.021**		0.61 (0.23, 0.99)	0.2	**0.002**	
Poverty rate (% pop)	0.08 (-0.15, 0.32)	0.12	0.484		-----	-----	-----	
Literacy rate (% pop)	0.08 (-0.39, 0.55)	0.24	0.743		-----	-----	-----	
Average distance to road	-0.24 (-0.83, 0.36)	0.3	0.440		-----	-----	-----	
Annual security incidents	0.00 (-0.01, 0.01)	0	0.540		-----	-----	-----	
	BIVARIATE RANDOM EFFECTS MODEL*				**MULTIVARIATE RANDOM EFFECTS MODEL****			
	Unadjusted Coeff. (95% CI)*	**Semi-robust SE**	**P-value**	**Rho**	**Adjusted Coeff. (95% CI)***	**Semi-robust SE**	**P-value**	**Rho**
Overall patient satisfaction	-0.14 (-0.36, 0.09)	0.12	0.235	0.46	-----	-----	-----	
Patient perception of quality	0.04 (-0.30, 0.37)	0.17	0.837	0.42	-----	-----	-----	
Village health council activity	0.15 (0.05, 0.24)	0.05	**0.002**	0.50	0.05 (-0.09, 0.18)	0.07	0.480	
Health worker satisfaction	0.05 (-0.22, 0.31)	0.14	0.738	0.46	-----	-----	-----	
Current salary payment	0.02 (-0.04, 0.08)	0.03	0.443	0.41	-----	-----	-----	0.56
Service provision score	3.62 (1.75, 5.48)	0.95	**<0.001**	0.51	3.38 (1.59, 5.16)	0.92	**<0.001**	
ln(Facilities per 100,000 pop)	11.86 (1.63, 22.09)	5.22	**0.023**	0.49	11.26 (-0.93, 23.45)	6.22	0.070	
Facilities per 1000km	0.47 (0.11, 0.84)	0.19	**0.011**	0.51	0.51 (0.11, 0.92)	0.21	**0.014**	
Poverty rate (% pop)	0.08 (-0.15, 0.32)	0.12	0.486	0.46	-----	-----	-----	
Literacy rate (% pop)	0.08 (-0.40, 0.55)	0.24	0.744	0.47	-----	-----	-----	
Average distance to road	-0.24 (-0.83, 0.36)	0.3	0.437	0.47	-----	-----	-----	
Annual security incidents	0.00 (-0.01, 0.10)	0	0.537	0.37	-----	-----	-----	

** Separate models for each variable: xtreg sba var, pa* (population average model), *xtreg sba var, re* (random effects model)

*** Combined models for select performance variables adjusted for ln(health facility coverage per 100,000 population) and health facility density per 1,000 km*

Curriculum Vitae
Hannah Tappis

PERSONAL DATA

529 N. Charles St., Apt. 202
Baltimore, MD 21201
Telephone: 917-756-4180
Email: htappis@jhsph.edu

EDUCATION AND TRAINING

2014	DrPH	International Health Johns Hopkins Bloomberg School of Public Health
2010	MPH	Health Management & Leadership Certificates: Public Health Informatics Johns Hopkins Bloomberg School of Public Health
2004	BA	History Certificates: Latin American Studies; African Studies Princeton University

PROFESSIONAL EXPERIENCE

2014 -	Research Advisor, Jhpiego – an affiliate of Johns Hopkins University Monitoring, Evaluation & Research Department
2010 – 2014	Research Fellow, Jhpiego – an affiliate of Johns Hopkins University Monitoring, Evaluation and Research Department
2009 – 2013	Research/Teaching Assistant, Johns Hopkins Bloomberg School of Public Health Department of International Health
2009	Gender Based Violence Program Manager, International Rescue Committee International Programs Department, New York Headquarters Office
2007 – 2008	Country Programs Manager, International Rescue Committee Sierra Leone Country Program, Freetown Country Office
2005 – 2006	Monitoring and Evaluation Manager, International Rescue Committee Northern Caucasus Program, Ingushetia & Chechnya Field Offices
2004 - 2005	Program Officer, International Rescue Committee Tanzania Country Program, Kibondo Field Office

PROFESSIONAL ACTIVITIES

Memberships
American Public Health Association

Consultations

2014 United Nations High Commissioner for Refugees (3/2014 – 4/2014) Consultant responsible for developing operational guidance on improving neonatal health outcomes in refugee settings.

2013 United Nations High Commissioner for Refugees (7/2013 – 12/2013) Field Researcher responsible for leading neonatal mortality study including survey of 17,500 women, verbal autopsies and health facility record review in Tanzania's Nyarugusu Refugee Camp.

2013 John Snow International/Maternal & Child Health Integrated Program (6/2013-9/2013) Research Consultant responsible for technical support to endline evaluation of a two-year maternal and child health project in nine governorates of Egypt.

2012 Catholic Relief Services (7/2012-9/2012) Health in Emergencies Advisor responsible for assessing the agency's capacity to respond to population health needs in acute and slow-onset emergencies.

2012 Catholic Relief Services (6/2012). Health in Emergencies Workshop Coordinator responsible for planning and co-facilitating a training on health emergency preparedness and response for senior technical advisors and regional staff.

2011 International Rescue Committee (7/2011-8/2011). Acting Deputy Director of Programs for IRC Pakistan responsible for US$37 million multi-sector humanitarian assistance program for conflict and flood affected populations.

2011 GOAL Ireland (5/2011). Technical advisor for design and development of US$50 million multi-agency nutrition program in Ethiopia.

2011 GOAL Ireland (3/2011). Team leader and technical advisor for US $1.2 million USAID Child Survival and Health Grants program application for GOAL Ethiopia.

LANGUAGES

English, native language.
Spanish, proficient both written and conversational.

PEER REVIEW ACTIVITIES

Nutrition and Food Science (2014)
African Evaluation Journal (2013)
Journal of Immigrant and Minority Health (2012)

GRANT REVIEW ACTIVITIES

Medical Research Council (South Africa) (2012)

HONORS AND AWARDS

2011	Dean Goodermote Award for Scholarship in Humanitarian Assistance
2003	Lawrence Stone and Shelby Cullom Davis Prize Fellowship for Historical Studies

PUBLICATIONS

Journal Articles

1. Fogarty L, Kim YM, Juon HS, **Tappis H,** Noh JW, Zainullah P, Rozario A. Job satisfaction and retention of healthcare providers in Afghanistan and Malawi. *Human Resources for Health.* 12(11): February 2014. Available at http://www.human-resources-health.com/content/12/1/11/

2. Doocy S, **Tappis H,** Paul A, Klemm R, Funna S. Preventing Malnutrition in Children Under Two (PM2A): A Case Study in the Food Insecure Context of South Sudan. *World Health and Population.* I4 (4): November 2013. Available at: http://longwoods.us1.list-manage.com/track/click?u=66444e84dfb3cded6886a80c6&id=7690ac2410&e=702ca699b3

3. Kim YM, Ansari N, Kols A, **Tappis H,** Currie S, Bailey P, van Roosmalen J, Stekelenburg J. Prevention and Management of Severe Pre-Eclampsia/Eclampsia in Afghanistan. *BMC Pregnancy and Childbirth.* 13(185): October 2013. Available at: http://www.biomedcentral.com/1471-2393/13/186

4. Kim YM, Ansari N, Kols A, **Tappis H,** Currie S, Bailey P, Semba R, Sun K, van Roosmalen J, Stekelenburg, J. Assessing the capacity for newborn resuscitation and factors associated with providers' knowledge and skills: A cross-sectional study in Afghanistan. *BMC Pediatrics.* 13(140): September 2013. Available at: http://www.biomedcentral.com/1471-2431/13/140

5. **Tappis H,** Doocy S, Paul A, Funna S. Food security and development in South Sudan: A call to action. *Public Health Nutrition.* 16(9): September 2013. Available at: http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8871734

6. **Tappis H,** Doocy S, Amoako S. Food commodity pipeline management in transitional settings: Challenges and lessons learned from the first USAID food development program in South Sudan. *Global Health: Science and Practice.* 1(2): August 2013. Available at: http://www.ghspjournal.org/content/1/2/193

7. **Tappis H,** Doocy S, Haskew C, Wilkinson C, Oman A, Spiegel P. UNHCR feeding program performance in Kenya and Tanzania: A retrospective analysis of routine Health Information System data. *Food and Nutrition Bulletin.* 33(2): June 2012. Available at: http://www.ingentaconnect.com/content/nsinf/fnb/2012/00000033/00000002

8. Kim YM, **Tappis H,** Ansari N, Zainullah P, Evans C, Bartlett L, Zaka N, Zeck W. Quality of cesarean delivery services and documentation in first-line referral facilities in Afghanistan: a

chart review. *BMC Pregnancy and Childbirth.* 12(1): March 2012. Available at: http://www.biomedcentral.com/1471-2393/12/14/

9. **Tappis H**, Biermann E, Glass N, Tileva M, and Doocy S. Domestic violence among Iraqi refugees in Syria. *Health Care for Women International.* 33(3): March 2012. Available at: http://www.tandfonline.com/toc/uhcw20/33/3

10. Kim YM, Zainullah P, Muniga J, **Tappis H,** Bartlett L, Zaka N. Availability and Quality of Emergency Obstetric and Neonatal Care Services in Afghanistan. *International Journal of Gynecology and Obstetrics.* 116: January 2012. Available at: http://www.ijgo.org/article/S0020-7292(11)00591-1

11. Doocy S, **Tappis H,** Haskew C, Wilkinson C, Spiegel P. Performance of UNHCR Nutrition Programs in Post-Emergency Refugee Camps. *Conflict and Health* 5(23): October 2011. Available at: http://www.conflictandhealth.com/content/5/1/23

12. Weiss WM, Vu A, **Tappis H,** Meyer S, Haskew C, Speigel P. Utilization of outpatient services in refugee settlement health facilities: a comparison by age, gender and refugee versus host national status. *Conflict and Health.* 5 (19): September 2011. Available at: http://www.conflictandhealth.com/content/5/1/19

13. Meyer S, **Tappis H**, Weiss W, Speigel P, Vu A. Health service utilization in refugee sites: more needs to be done. *American Journal of Disaster Medicine.* 6 (4): July/August 2011. Available at: http://pnpcsw.pnpco.com/cadmus/testvol.asp?year=2011&journal=ajdm

Book Chapters

1. Bartlett L, Aitken I, Smith JM, Thomas LJ, Rosen HE, **Tappis H**, Burnham G. "Addressing maternal health in emergency settings", chapter 16 in eds. Hussain J, Binns AM, Webber R. *Maternal and Perinatal Health in Developing Countries".* June 2012.

ADDITIONAL INFORMATION

Personal Statement of Research

My research interests are focused on humanitarian program effectiveness and health service delivery in fragile and conflict-affected states. Specific interests include:

- Population based assessments
- Health service evaluations
- Maternal and newborn health program implementation
- Monitoring and evaluation of humanitarian assistance programs
- The impact of conflict on health systems and population health

Key Words

Humanitarian Assistance, Complex Emergencies, Fragile States, Maternal Health, Operations Research, Monitoring and Evaluation